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MAY 1987

Business Technology, Office Automation, Computers

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TRACY TURNER

Desktop publishing: Creating an image for your business

Using the power of the computer in graphic arts.

by Dale Archibald

What is desktop publishing? In my lexicon, it is a situation where one person controls placement of text (and possibly graphics) to the point where a finished piece of computer-generated work becomes camera-ready copy—that is, it can be delivered to a print shop or office copying machine. All that remains to be done is for the print shop's camera to create a printing plate, or for the copier to reproduce that computer-generated original in required quantities.

The desktop publisher might be the secretary who uses a word-processing program to create sheets of price changes, or the educator who writes an indexed, footnoted thesis. It may be the middle-management person who compiles a report—complete with graphs and charts—using a piece of integrated software. It could be the sales manager who designs a commonly used form for interoffice use, or the fellow in the warehouse who assembles an inhouse illustrated catalog of various parts.

Then, of course, there are the traditional and well-advertised desktop-publishing mavens who are laying out newsletters, sales brochures, even magazines and newspapers.

In many organizations, text is created and approved by specialists; graphics and designs are treated the same way. Networks can pass these elements back and forth more easily than walking a sheet of paper down the hall. Once every aspect has been approved, which is also faster than by traditional methods, they all come together at one workstation for final compilation and camera-ready output.

Word-processing programs already have a multitude of features that overlap the desktop-publishing area. Versions of *WordPerfect*, *XyWrite* and Microsoft *Word*, to name just three, are capable of showing columns of text on the screen. They can show boldface and other typefaces (albeit only in one size). Hercules Computer Technology last fall announced the Hercules Graphics Card Plus, a monochrome graphics circuit board that works particularly well with *Word*. This increases its speed and allows 27 different fonts to be included in documents, although there were some early problems with getting those onto paper. At some point in the future, the user will probably be unable to distinguish a word-processing program from a desktop-publishing package.

Apple's *MacWrite* and *Word* for the Apple Macintosh are very close to desktop publishing: Files created with these word processors can be transferred into an Aldus *Pagemaker* document without having to be reformatted or changed in any way.

Or look at an integrated program such as Microsoft *Works* for the Macintosh, Ashton-Tate's *Framework II* or *Ability* by Migent Software for the IBM compatible. These allow you to intermingle words with charts and graphs inside one document, as long as your computer has graphics capability.

In the end, it's the factor of constant control at your fingertips that may be the most important aspect of desktop publishing. No longer must the person who works on a project for graphics reproduction rely on outside typesetting firms, page designers and keyliners. No more will X-Acto knives, waxers, rubber cement, blue pens and the like be added

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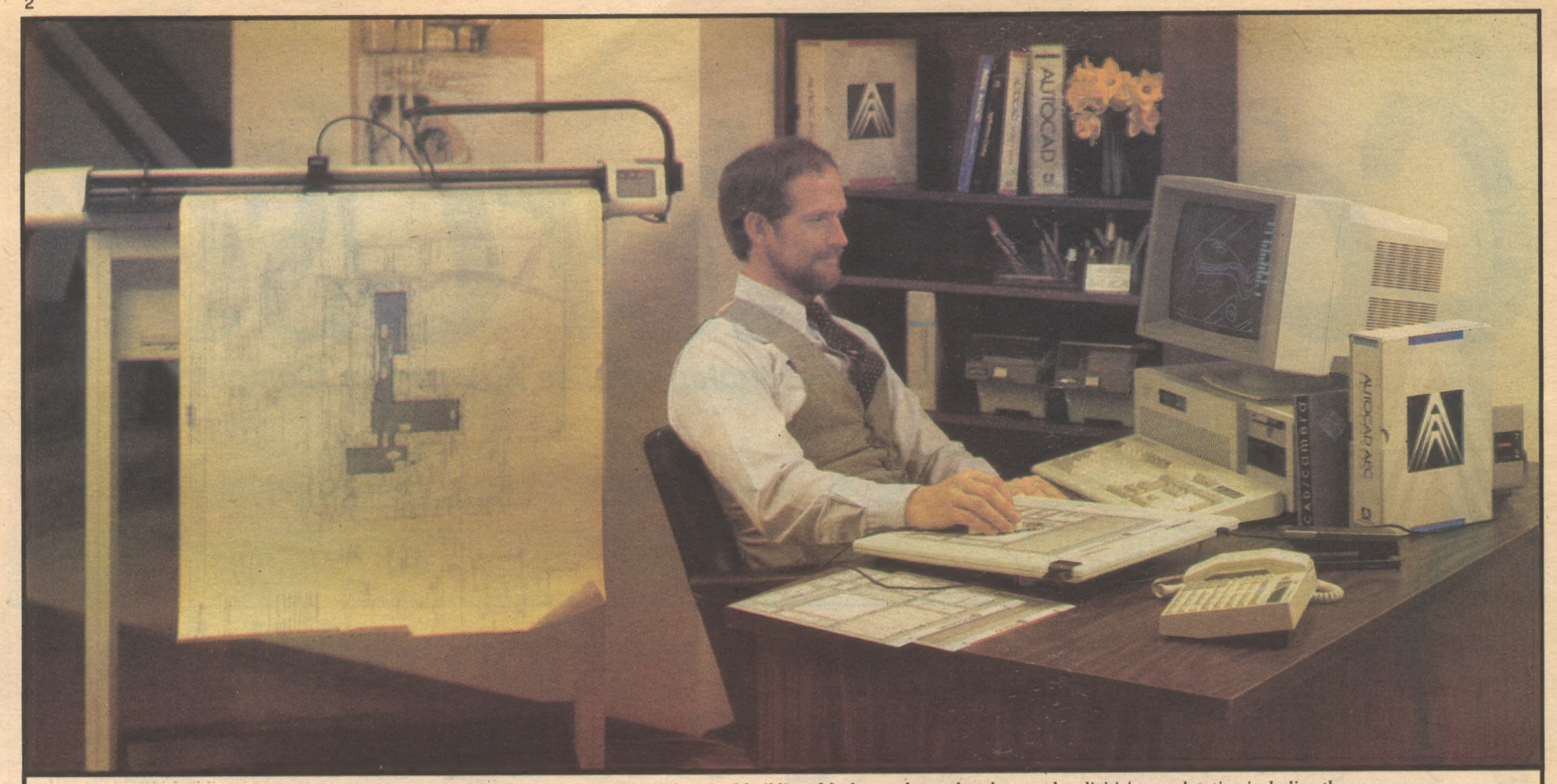
Flying faster

When something needs to be fixed, the commercial-aircraft industry can't wait. At Aero Controls, Inc., in Auburn, networked PCs help the growing repair company answer customer queries, manage FAA paperwork and locate aircraft components. See page 22.



E. Mark Smith of CADRE is seen here digitizing a drawing of a school building. Mark recently purchased a complete digitizing workstation including the PowerPak 286 Computer, software, Houston Plotter and Scanner. Mark is now offering a service to digitize drawings. Call Mark for information at (206) 641-7923.

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EDITOR'S NOTE

The deadlines are relentless but editing *Puget Sound Computer User* is not without its fringe benefits. Because I usually work at home, I can afford to sleep longer than the typical commuter. After all, it's just seconds from bed to desk, with a few stops along the way to convince my body that I still care.

Each morning when my clock radio drags me back across the twilight zone to what we grudgingly accept as reality, I'm greeted by a traffic report. The news is seldom good; a collision here, a stalled car there. Gridlock grips the city, the eyes in the sky tell me.

At such times I must confess to feeling a little smug about my situation. I am not without compassion for my fellow humans, however. From my perspective beneath the warm covers of my bed, I have frequently pondered the sorry state of the miserable wretches trapped out there in morning motorway madness.

I read somewhere that Seattle ranks sixth in the nation in traffic congestion. This is even higher, I believe, than the Southern California megalopolis which is well endowed with freeways. Despite projects such as Seattle's bus tunnel, the congestion here seems unlikely to improve. High-speed mass transit might provide some relief if only the political process could get moving.

But why wait for the politicians? Some commuters have another option in this day of computers and telecommunications. Those who work mainly with information can telecommute. If area companies embarked on an aggressive campaign to promote telecommuting, traffic congestion and air pollution could be reduced simultaneously.

This isn't a new idea, of course, and there are plenty of reasons telecommuting hasn't caught on. Managers are afraid to trust employees who work at home, unions don't always like the notion, and interpersonal communication is best when you're in the same room as your colleagues.

Still, a creatively managed program using the most recent technology could make telecommuting an option for more area residents. Although making telecommuting work is not purely a technical problem, new opportunities are appearing because of technology.

This fall, Pacific Bell plans to begin the second California field trial of its Project Victoria, a technology that allows a single phone line to carry seven simultaneous voice and data channels. Potential telecommuters should be interested in how it comes out.

With desktop-publishing and computer-aided-design technology, many business documents and illustrations are being created electronically. This makes it possible to send copies over the phone line at nearly the speed of light. Further, electronic mail is becoming competitive with the U.S. Postal Service, so sending paper documents through the mail isn't necessary.

Even if employees telecommuted just a few days each week, it would make a difference on the freeways. So next time you're trapped in a carbon monoxide-belching herd of machines, ask yourself, "Is this trip *really* necessary?"

Terry Hansen

—Editor

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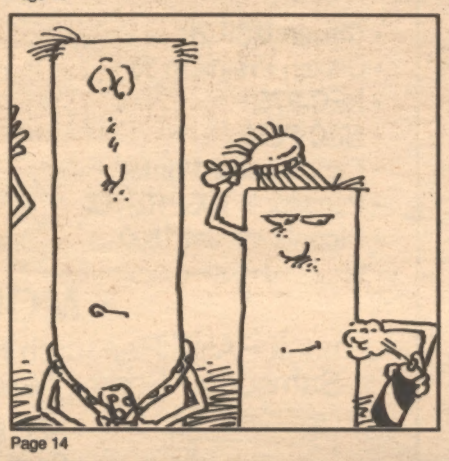

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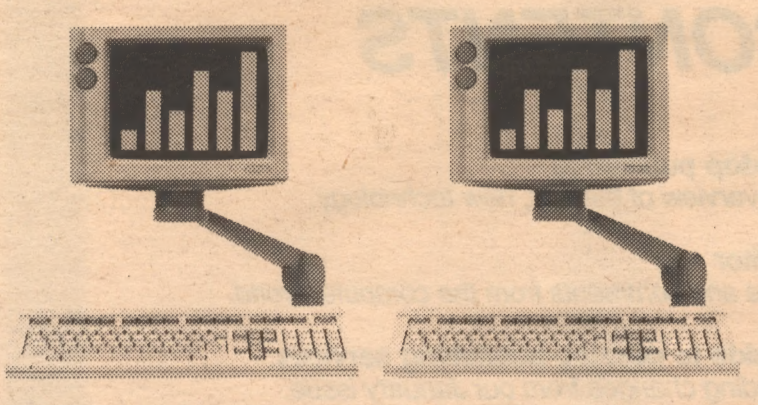

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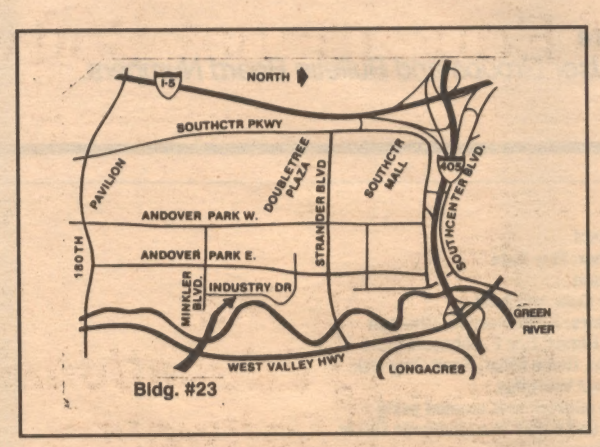

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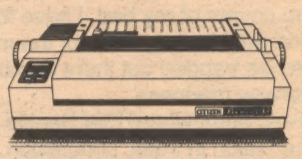
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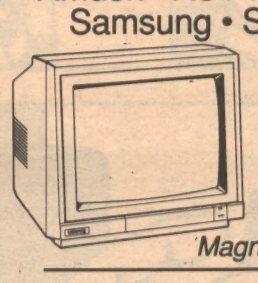
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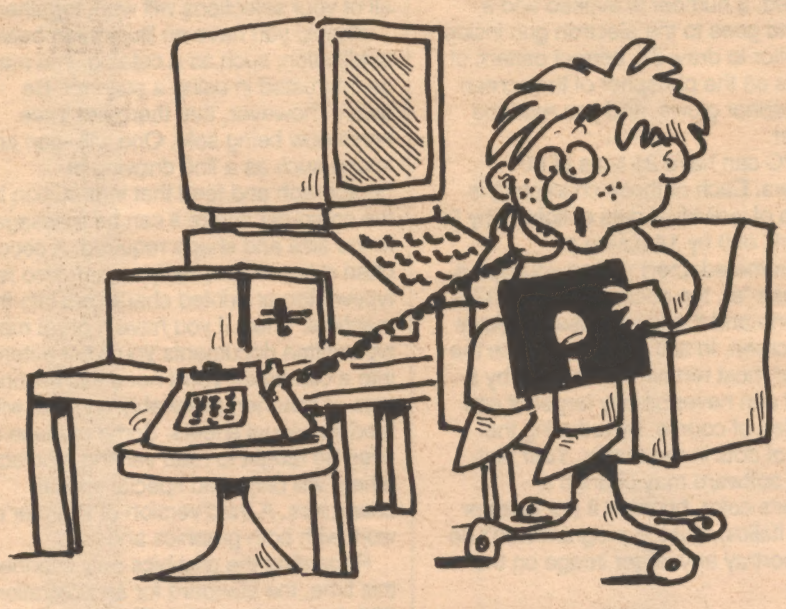

"It's hard to make it out, but when I put it in upside down I get 'devil worship.'"

NEWS FROM BIG BLUE

IBM's plans became more clear last month when it announced a line of new personal-computer products. The IBM Personal System/2 line includes four new PC models ranging from the Model 30, based on the 16-bit 8086 microprocessor, to the Model 80, based on the 32-bit 80386 chip. The other two lines, Models 50 and 60, are based on the 80286 chip used in the IBM PC-AT.

IBM, in conjunction with Microsoft, also introduced a new operating system, PC-DOS 3.3, which is required by the new machines. A more advanced operating system called OS/2 will not be available until some time early next year, according to the company. OS/2 will be a so-called multi-tasking operating system (it can run several programs simultaneously) that will allow users to interact with the computer using pictures (windows) and symbols (icons).

An operating system is the software that enables users to manage information and programs inside a computer.

Aside from following established industry trends toward faster performance and increased use of graphics, the new products seem to incorporate no major technological leaps. Perhaps the most surprising news was that IBM's long-expected 80386-based computer, the Model 80, won't be available this year. A number of competitors have already introduced powerful 32-bit 80386-based machines and many industry observers expected IBM to be more aggressive in pursuit of this competition. (Wall Street may have been surprised, too, because IBM's stock actually dropped two points the day of the announcement.)

Because IBM intends to shake off the competition from makers of work-alike products known as "clones," the new computers depart significantly from standards established by the earlier IBM PC product line. Consequently, it is difficult to guess what the impact of the new products will be. According to trade-press accounts, corporate buyers appear cautious but generally positive about accepting the new machines.

On the other hand, small businesses which have a substantial investment in PC/MS-DOS machines and software may be more reluctant to accept IBM's new computers. Although most software developed for PC/MS-DOS machines should run on the new IBMs, the company said, software developed specifically for the new machines will not run on earlier models.

IBM will continue to sell its old PC line, albeit at reduced prices. Meanwhile, the clone makers will continue to sell copies at ever cheaper prices.

Despite IBM's attempt to kill off the clones with its new machines, some manufacturers have said they will attempt to copy Big Blue's new product line, according to a report in the Apr. 13 issue of the trade weekly *InfoWorld*. If so, there may be some interesting legal battles ahead.

In light of all the recently announced machines, we plan to devote much of next month's issue to a more in-depth analysis of recent changes in the personal-computer business.

THE FRENCH CONNECTION

Jean-Louis Gassee, Apple's vice president of product development, was in Seattle recently to promote his book, *The Third Apple*, published by Harcourt Brace Jovanovich. Gassee was also the featured speaker at the April Macintosh Downtown Business Users Group held at the Crowne Plaza Hotel on the 14th.

After an introduction by Microsoft's Bill Gates, Gassee reviewed the evolution of the Macintosh product line and fielded questions from current Mac users. He described the new, open-architecture, top-of-the-line Mac II as "a reincarnation of the Apple II."

A highlight of the evening was a dazzling Mac II demonstration presented by fellow Frenchman Didier Diaz, project manager for the new product. The demo made extensive use of the Mac's impressive color graphics and compact-disk-quality sound. It was clear the Mac has come along way since the introduction of the original 128K version. The powerful new machine will provide tough competition for the new generation of 80386-based MS-DOS machines.

Apple kicked in with a lavish spread of food and drink, so the approximately 450 attendees left with French cooking in their stomachs and technolust in their hearts.

GRAPHIC DEPICTIONS

So, you've just acquired a new desktop-publishing system. But now you're not sure your graphic-design skills are up to speed with the new equipment.

Well, relax. Seattle's Aldus Corp. has just published a primer on graphic-design basics. The *Aldus Guide to Basic Design* is a 68-page volume complete with copious examples of attractive page designs. The book offers tips for creating better-looking documents and sells for $6.95. It's being sent free to new *PageMaker* users upon return of their registration cards, or upon updating from version 1.2 to 2.0 of *PageMaker* for the Macintosh.

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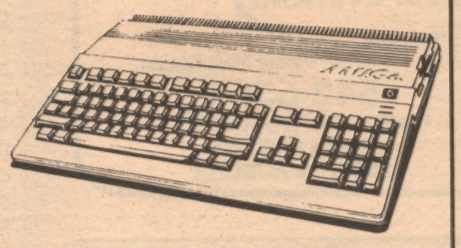

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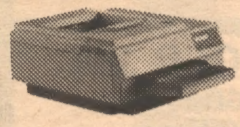

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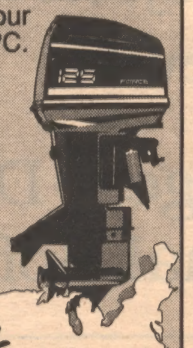
NOTE: This ad was produced using the Adobe Illustrator, Quark EXpress and proofed on an Apple Laserwriter. Final output was done at 1270 dpi on a Linotronic L-300.



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Desktop publishing
continued from page 1

to the budget. One individual can create the concept, set body copy and headlines, lay out the page, move graphics in with some sort of scanner and adjust their size and position on the page, then finally print out a finished image on a laser printer ready for the print-shop camera.

Where the applications are

According to Apple Computer publicist Janel Hopper, about 40 percent of the desktop-publishing market is producers of newsletters, brochures, and flyers. Twenty percent and growing is producers of simple documents, such as memos and letters. Another 20 percent and growing is producers of complex documents—things like manuals and directories. Still another 20 percent and growing is illustrators and graphic artists.

Under hardware, 40 percent of the firms buying equipment are offering professional services, such as advertising agencies and publishers. Another 20 percent are in other services (such as consultants, health professionals and real estate people), with 20 percent more in key departments in corporations; these include training, sales and marketing. Ten percent is in government, while the last 10 percent are in nonprofit organizations and education.

There is, of course, a variety of desktop-publishing software available for the Apple Macintosh. That's understandable, since the Mac is really the machine around which much of the excitement in the area circulates.

The basic requirement for a desktop-publishing configuration is, of course, a computer. Even before you get this far, however, you should think a bit about the type of work you're going to be doing. The first watershed choice you'll have to make is whether you will want graphics you can manipulate. If you're only going to be doing word processing, without any images or multiple fonts and type sizes, and you're willing to paste down artwork and set headlines with press-on type, then you should be able to use any computer.

If you do want to include images on your documents, things become a bit more complex. They can also become murkier if you decide you need what-you-see-is-what-you-get monitoring.

A graphics-oriented machine, such as the Macintosh, Amiga or Atari ST, draws the character on the screen as part of a graphic. When it draws an "a" on the monitor, for instance, the machine plots every picture element (pixel) as a dot of light on the screen, whether it's turned on or off. This pixel is ordered by a bit—short for binary digit—that can be either on or off. Even the background must be accounted for.

Once the drawing instructions for a particular character are in this type of computer, it can flawlessly draw ever-larger "a"s on the screen by turning on more pixels in the correct design in 360 degrees. That is, it doesn't just double pixels up, down, right and left.

Having to plot every pixel is one reason why the Macintosh screen is so small. To keep that fine sharpness, or resolution, the Mac uses a resolution of 72 dots per horizontal inch. When you square that, it's 5,184 dots in one square inch. Each dot is a bit; eight bits is a byte. The larger the screen, the larger the amount of memory that must be devoted to the graphics.

The speed of the computer is affected by the intricacies of the graphics. That's because, since the entire screen is one graphic, any changes must affect the entire screen—as if a painter needed to repaint a picture each time he or she daubed another stroke.

The Macintosh was designed with graphics capability in mind. As such, the desktop-publishing area has really helped Apple establish this as a business machine.

A computer that's based around text, such as the IBM PC and compatibles, Apple II line, and those that use the CP/M operating system, place the character on the screen as just a number. When a key is touched, a number is evoked and a command goes to the electron gun inside the monitor to draw the correct pattern of electrons on the phosphor of the screen. The phosphor glows, and you read the character.

The PC can have 25 lines of 80 characters. Each of those characters is made up of individual dots of light (7 by 9) in a matrix of 9 by 14 (using a monochrome adapter). When you type a lower-case "a", the decimal number 97 is called forth and the lower case "a" glows on the screen. In text mode, because the character must remain within the 7 by 9 matrix, it can never be any larger. It can be smaller, of course, by reducing the number of dots in the matrix. Your text-oriented software may change a character's color, brighten it (for bold) or tilt it (for italics), but the program won't be able to portray any larger image on the monitor.

The Mac is really the machine around which much of the excitement circulates.

Text orientation is much faster when you change from page to page than when the computer is forced to draw an individual image of each of the characters on a screen.

You can begin to take advantage of some of the features offered by graphics-strong computers if your text-oriented equipment allows you to install a graphics circuit board, or card. Again, you'll be forced to trade speed for this new full-screen graphics capability.

Graphics adapters

If you own or decide to buy an PC or compatible, you really should invest in the best graphics adapter you can afford. At this time, there are three basic levels.

First, there's the Color Graphics Adapter, or CGA, that was introduced at the bottom of the line of IBM color adapters. It can display four basic colors in resolutions of 640 dots by 200 lines and 320 dots by 200 lines. Text appears in an 8-by-8 pixel character box.

Hercules Computer Technology has unveiled the Hercules Graphics Card. This is a monochrome (single color) graphics adapter that can display 720 dots by 348 lines on a monochrome monitor.

Second, the IBM Enhanced Graphics Adapter (EGA) can display 16 colors at a resolution of 640 by 350. The character box in text mode is 14 by 8; one graphics mode allows 14 by 8 (the others are 8 by 8). It and its clones all offer 256K of display memory; this serves as a buffer where graphics images can be stored, and allows images to scroll more smoothly and rapidly.

The third IBM level is the Professional Graphics Controller, very high resolution, but also very expensive.

To date, color is not important to a discussion of desktop publishing. In its place, you want resolution and speed. The sad fact is, to match the graphics of the Mac using a PC-compatible today, you'll be forced to spend quite a bit more money. You would need the machine—either a PC or, better yet, an AT compatible—with its random-access memory (RAM) expanded to its upper limit, one of the graphics adapters listed above, a cursor-controlling mouse and perhaps some way to speed up the processor even further. Either type of machine would do a better job with a hard-disk drive. And you must be certain that all of your selections will work together.

Should you have an illustration-heavy publication, such as a catalog, you may be interested in using a scanner. Be aware, however, that there are three types now being sold. One will scan an image such as a line drawing or photograph and feed that information into the computer where it can be massaged to the size and shape required. A second, often more expensive type, can also read typewritten or printed characters into the machine. Thus, if you have a great many typewritten documents you want entered into a computer, you'll need this second type of scanner, preferably one that will feed individual sheets. Some of these can even be taught to read varying typefaces; others will only read special optical characters. A third version of scanner can work with both graphics and text.

Regarding the graphics-only scanner: at this time, the standard for an illustration is 300 dots per inch (dpi). The scanned image will probably need to be translated into a compatible format for the software. The input time for a scan can range from 30 seconds or so to up to an hour or more, depending upon the unit and various settings.

You still will not have an image that looks like the halftone print used to reproduce a photograph, however. First, a photographic image is formed through gradually-changing shades and tones caused by chemical and light reactions. A halftone is a simulation of a photograph, created by placing a screen over the photo and taking a photo of that. Where the screen intersects at a dark section of the photo, the halftone has a large dot of black. If it intersects at a lighter section, the dot is much smaller. Thus, you have a regular pattern of dots of various sizes. When that pattern goes through a printing press, the dots place ink on the paper according to size.

The digitized image, on the other hand, uses a dot of constant size, the pixel. There is no pattern. Where a photo is dark, the scanner clumps pixels; where it's light, the scanner uses fewer. At present, 300 dpi results in a much coarser reproduction of the photo than even a newspaper screen.

If you're putting out rough-and-ready material, such as a catalog where looks aren't important, the resulting image might be suitable. Or, you could use these digitized images for size and placement, then strip in halftones over them at some point.

If you've decided you want to use a PC compatible (or perhaps you already own one), even if you do have to spend more money, you could have problems with software compatibility. Not all software will work with all hardware. If you already have a laser printer, select software that can drive your model.

Remember that the software already on the market was written for existing models of the Macintosh, not the recently announced models. *Ready, Set, Go 3*, *Xpress* and others await the Mac aficionado with the units of today.

Other technologies are also making inroads into the desktop-publishing market. Facsimile equipment, for instance, can now be linked with scanners and word processors to rapidly send documents around the world. Modem manufacturers struggle to ensure that new software will be able to send complete documents through their machines.

The desktop-publishing area is one of the fastest-growing parts of a fast-growing industry. As such, it will continue to suffer aches and pains. Even so, if you need to create attractive graphics on a regular basis, you should begin to explore the possibilities a computer can offer you to save—or make—money. **CU**

(Dale Archibald is associate editor of Puget Sound Computer User.*)*

Desktop Publishing Services in the Puget Sound Area

The following is a directory of Puget Sound-area desktop publishing services. This list was updated in early April. Please note that computer hardware/software dealers and developers are not included.

We're defining desktop publishing as using a personal computer and page-layout software to prepare completed, camera-ready pages, as opposed to traditional typesetting and cut-and-paste production. (If you've been left out of this directory, please write us and we'll include you in an addendum.)

A-Follo, 338 N.E. Northgate Way, Seattle, WA 98125. 364-2679. Macintosh Plus rental (on site), word processing, laser printing, duplicating, printing services.

Advertizing & Design Services, 4327 Rucker Ave., Everett, WA 98203. 259-0598. Graphic design, logo design, newsletters, four-color brochures, copy writing, print media ads, periodicals & magazines, modem transfer capability, 24-hour disk turnaround.

Alphagraphics, 13279 N.E. 20th St., Bellevue, WA 98005. 746-6130. Mac rental (on site & off site), LaserWriter rental, stock designs (business forms & stationery), printing services.

Alphagraphics, 944 3rd, Seattle, WA 98104. 447-9409. (Same services as above.)

AutoPage Co., Dick Brown, 8340 - 16th Ave. N.W., Seattle, WA 98117. 782-2534. Desktop publishing consulting for *PageMaker*/Macintosh systems.

City Words, 230 - 14th Ave. E., #101, Seattle, WA 98112. 322-2496. Design & layout, press releases, marketing communications.

Common Sense Publishing, 911 Western Ave., Suite 401, Seattle, WA 98104. 624-8254. IBM - Mac File transfers; Newsletters our specialty - large graphics library; Mac Plus rentals: on-site and off-site.

Data Graphics, 911 Western Ave., Suite 414, Seattle, WA 98104. 624-9824. Presentation graphics (all sizes-BW/Color), visual aids, print media aids.

Desktop Graphics (John Laney), 85 S. Washington St., Suite 308, Seattle, WA 98104. 625-1160. Macintosh illustration, Adobe *Illustrator* design, desktop publishing.

Doug Brown, P.O. Box 937, Eastsound, WA 98245. 746-9040. Desktop publishing seminars, consulting & copy writing.

First Step, 13433 N.E. 20th, Suite R, Bellevue, WA 98005. 643-9755. Desktop publishing using Macintosh Plus and LaserWriter. Graphics design, copy writing, corporate ID packages, newsletters, brochures, print media ads, forms.

James Morse Micro-Publisher, 809 - 24th Ave. E., Seattle, WA 98112. 328-4631. Specializing in newsletters, ads & fliers on the Macintosh & Laser-writer. Includes in-house photography, image scanning capabilities & tutoring in Mac use.

Laura Kvasnosky Graphic Design, 5538 - 31st Ave. N.E., Seattle, WA 98105. 525-5552. Full-service graphic design emphasizing desktop publishing.

Laser Services Unlimited. (By appointment.) 789-6841. Macintosh & LaserWriter Plus typesetting/standard typesetting, custom business forms, graphic design, word processing.

Lasergraphics, 1605 - 12th Ave, Suite #9, Seattle, WA 98122. 322-4929. Computer graphics, laser typesetting, publication & production specialists, disk conversion, scanning, printer broker, color separations.

Laserprint Connection, 25250 Pacific Hwy. S., Kent, WA 98032. 941-1402. LaserWriter rental, laser printing, graphic services, typesetting.

LaserPro, 24805 - 22nd Ave. S., Kent, WA 98032. 824-5266. Production, editing, laser printing of catalogues and manuals using *Ventura Publisher*. Familiar with PC-based publishing tools.

Laserworks, 7211 Greenwood Ave. N., Seattle, WA 98103. 789-6544. Mac and LaserWriter rental (on site), typesetting, layout & production, resumes, newsletters, books & manuals. Modem transfers from IBM accepted. Tutoring. Mac Zoo user group.

Laserwriting, 7032 E. B St., Tacoma, WA 98404. 472-2787. Consulting & training, forms, typesetting & layout, Reflex consulting.

Laserquick, 110 - 1st Ave. S., Seattle, WA 98104. 382-4118. Laser printing, Mac rental (on site), copying, printing, self-help tutorials for Mac.

Laserquick, 2022 - 148th NE, Redmond, WA 98052. 746-3070. Laser printing, IBM-compatible equipment, Mac rental (on site), printing, copying, self-help tutorials for Mac.

Laserquick, (Times Square) 412 Olive Way, Seattle, WA 98101. 622-4387. (Same services as above.)

Laserquick, 333 - 184th St., Suite S, Lynnwood, WA 98037. 672-2679. (Same services as above.)

Lee Sylvester/Art Direction, 1818 S. Weller, Seattle, WA 98144. 323-2620. Desktop publishing systems consultation-conversion of existing publications to D.P. & art direction of new/existing publications.

Magic Fingers Graphic Communications, 1104 Mercer, Suite 4, Seattle, WA 98109. 382-9495. Macintosh typesetting & graphic design; editing & proofreading services available.

The Newsletter Company, 230 - 14th Ave. E. #101, Seattle, WA 98112. 322-2496. Consulting, writing , editing, typesetting, graphics, design, layout, & printing.

N.W. Tech Systems, Inc., 12727 N.E. 20th, Suite #16, Bellevue, WA 98005. 883-7765. Desktop publishing, image scanning, graphics, optical character recognition, computer-aided design.

Olav Martin Kvern, 4400 Wallingford N. #18, Seattle, WA 98103. 633-3617. Computer graphic designer/illustrator, technical writer, desktop publishing expert, computer/electronic music composer. Skilled in Macintosh illustration.

Olympic Publishing, P.O. Box 353, Port Ludlow, WA 98365. 437-2277. Mac typesetting, design. Magazines, books, brochures. Publisher of *Olympic* magazine and *Washington Expo Pavilion Guide Book*.

One Day At A Time, 2022 Fairview Ave. E., Seattle, WA 98102. 322-5313. Laser printing, list & labels & bulk mailing, advertizing, typesetting & word processing, graphics services, brochures, forms.

PIP Type, 1500 S. 336th St., Federal Way, WA 98003. 838-9167. L100 processing, typesetting, modem services, printing & binding. In Tacoma, call 927-0860.

Rainbow Services, 5515 - 15th N.E., Seattle, WA 98105. 525-4266. Ads, flyers, cards, layout, newsletters, desktop publishing - *MacWrite*, *MacPaint*, *MacDraw*, Thunderscan, *PageMaker*, data processing.

Seattle ImageSetting, 1115 Boylston Ave., Seattle, WA 98101. 324-0838. L100 processing (film or paper) for Mac or PC, disk conversion (CP/M, Mac or PC), high-resolution scanning, Mac Plus rental (on site), scanner rental (on site), modem transfer.

Seattle MicroPublishing, 1728 - 11th Ave., Seattle, WA 98122. 328-4144. Complete support: computers, high-res. monitors, laser printers; page-makeup software; classes, consulting, technical writing, computer bulletin board for PC publishers (322-8655).

Southcenter Printing, 603 Strander Blvd., Tukwila, WA 98188. 575-8492. Laser printing, typesetting, layout & production, printing.

SR Publishing Associates, 10205 - 162nd N.E., Redmond, WA 98052. 881-6377. Full-service writing, production, printing. Consulting for new desktop publishers.

The Laser's Edge, 220 - 106th Place N.E., Suite C, Bellevue, WA 98004. 462-9855. Brochures, technical diagrams, flyers, books, catalogues, graphic services, newspapers, layout, design & printing.

The Right Type, 17811 Woodinville Duvall Rd., Woodinville, WA 98072. 486-3075. Typesetting, books & publications, Mac rental (on site), LaserWriter rental, layout & production. Modem & IBM-Mac transfers.

The Wordsmith, 4830-1/2 California Ave. S.W., Seattle, WA 98116. 937-6998. LaserWriter printing, publishing, typesetting, graphic design, layout & production, copy writing, scanning, copy service.

Western Type, 2403 - 2nd Ave., Seattle, WA 98121. 728-6700. Typesetting, disk duplicating & conversion, computer renting and service, desktop publishing, graphic services.

WIZYWIG, 3151 Elliott Ave., Suite 210, Seattle, WA 98121. 283-3069. L100 & L300 processing, image scanning with Princeton Graphics LS-300, 24-hour BBS, stats, type & software sales (Adobe).

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MACINTOSH FONTS: BLESSING OR BLUNDER

Downloading typefaces to enhance your documents.

by Paul Williams

You finally did it. You sold your golf clubs, took out a second mortgage on your house and bought a Macintosh and an Apple LaserWriter printer. Now you're ready to become a great desktop publisher, right? Well, it looked good until you needed fancy script for a wedding invitation. And when you did the headline for your newsletter, Times Roman was just not up to the job. The laser output looks good, but you need more versatility.

What you need, you've decided, is more typefaces, which are contained in sets called fonts. So you're off to your friendly Apple dealer to tell him your tale of woe. No problem, he says, just get out your credit card. For a few bucks each he has all kinds of fonts that you can buy and use with your LaserWriter. But you're just a little skeptical. Will these new fonts be as good looking as your old Times and Helvetica? Are they worth the money? Will they work with your computer? Are they hard to use?

In order to answer these questions and help you to understand downloaded fonts, let's take just a moment and look a little closer at how the Macintosh and LaserWriter work together, and find out just what you have to buy.

If you've used the Mac you have seen a font menu in almost every program. This menu allows you to select the kind of type that you want to appear on your document when printed as well as what kind will appear on the screen. A font is the actual electronic description of the typeface that you have chosen; most people say font when they mean typeface. For instance, Times Roman is a typeface; the description of it is contained on a font. The Macintosh can change the style of any given typeface so it will look bold, italic, outlined, shadowed, underlined or any combination of the above, working from information contained on the font.

The Macintosh and the LaserWriter use two different kinds of fonts. Bit-mapped or screen fonts are used for the Macintosh to display text on the screen. They are installed in the system file of the computer with a utility program from Apple called a *Font D/A Mover*, which is provided for this purpose. Once installed, these fonts will be available in the font menu of any program that is using that system file.

In order to reproduce your text in high resolution on the LaserWriter, however, a companion to the bit-mapped font is needed. This is called a laser or PostScript font. This is a file written in a character-description language called PostScript that the LaserWriter understands. It is prepared by carefully drawing images of each letter, using a drawing program similar in many respects to *MacDraw*. When the drawings of the letters are completed, the font-making program generates the PostScript description or file for that font to be used by the LaserWriter, as well as bit maps for screen display in various sizes that the operator can specify. In the case of Times, Helvetica or Courier you never see the PostScript files because they are permanently installed in the LaserWriter's memory during manufacture.

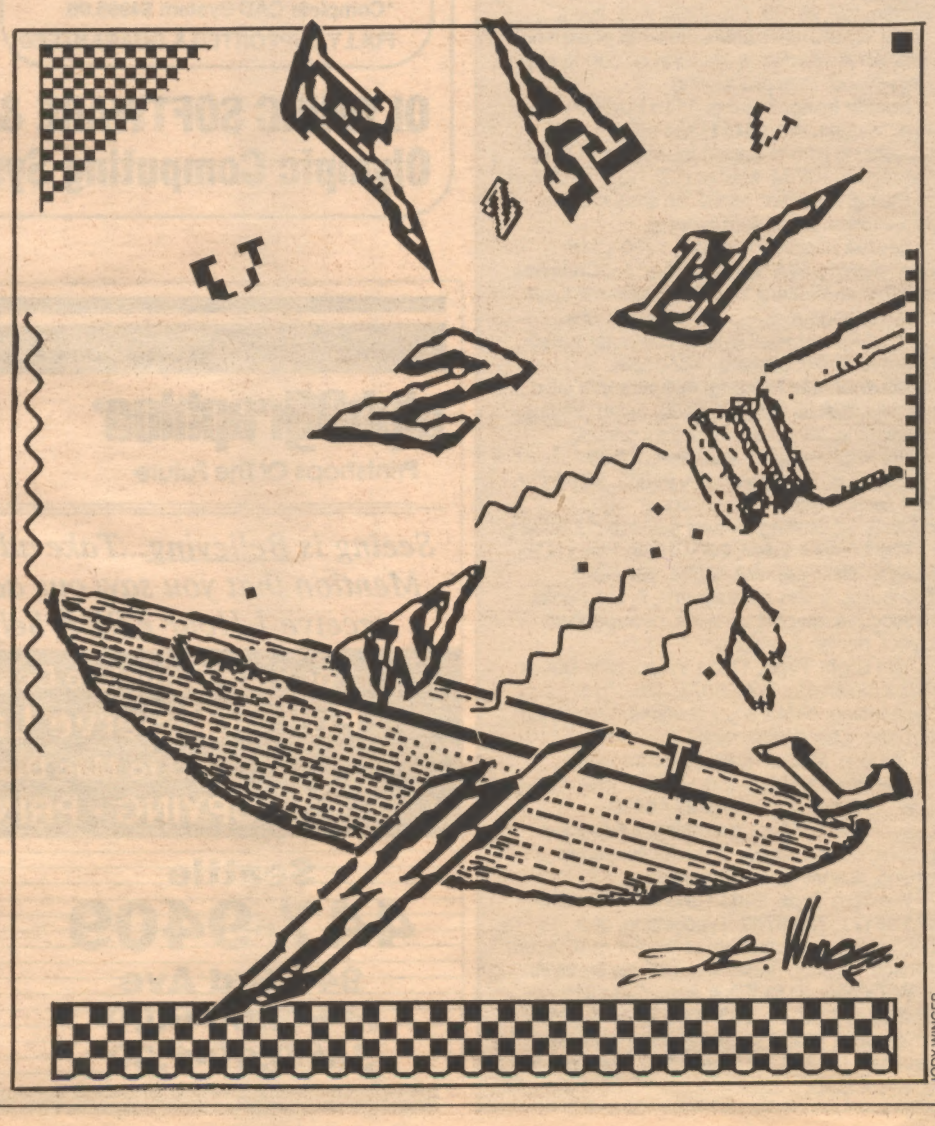
Since there is such a need for a wider selection of laser fonts, several independent companies produce downloadable fonts, which means that they can be sent or loaded down to the printer from the computer. These comprise both bit-mapped and laser fonts just like the ones that come built into the LaserWriter. The difference is that the PostScript laser font is kept on your system disk in the computer, rather than in the LaserWriter's memory. Both kinds of fonts are actual files that you can see. They have icons like other files (though their icons look different to set them apart) and can be moved from disk to disk just like any other kinds of files.

When you print a document from an application like *MacWrite* the computer looks for the laser font on your system disk, reads the file and sends the information it contains to the LaserWriter so that it will know how to draw the selected font. This process is fully automatic and requires no action on your part. In fact, you won't even know it's happening. (Up to now we have only been referring to the Apple LaserWriter. There are other printers that will read PostScript files, including some expensive typesetting systems. For our discussion, however, we will concern ourselves only with the LaserWriter.)

How do you get your new fonts into your computer and working for you? Laser bit maps are installed the same way as Imagewriter fonts, with the *Font D/A Mover*. To install a screen font you start the program by double clicking its icon on the desk top. The program will display all of the fonts currently loaded into your system file. You now press the open button on the other side of the display and choose the font family that you wish to put into your system file. Click on the point sizes you wish to transfer and press the copy button. Fonts are deleted from the system in the same way, only you select what you want to remove from the system side and then press the remove button.

Installing the PostScript laser fonts is even easier. You just drag its icon from the master-font disk that you purchased onto your system disk and into your system folder. This will copy the laser font onto your system disk. It's just like copying any other file or program. There is nothing else to do. The laser font only has to be on the disk when the computer looks for it and it will work in exactly the same ways as the built-in fonts. In fact, you can still use the built-in fonts unless you remove their bit maps from the system file. One note of caution: You must be careful to put the laser-font icon into the system folder. If you don't, the computer may not be able to find it.

Although downloadable fonts have greatly increased the flexibility of the LaserWriter they are not an unmixed blessing. There are some problems that can occur when using them. An understanding of these problems can save you a lot of frustration.



JODY WINGER

First, since the laser font is stored on disk rather than in the printer's read-only memory, a certain amount of time is needed to send the font from the computer to the LaserWriter. Although this takes only a few seconds, it will increase the overall time needed to print a document. This is especially true if more than one downloaded font is used. It follows then that very complex documents including several fonts will take a very long time to print, sometimes many minutes.

The second problem relates to the first. The LaserWriter has only a limited amount of memory allocated for storing fonts—about 175 kilobytes (K) out of its 1.5 megabytes (million bytes, or characters) of memory.

Further, this little corner of the machine's memory has to be shared with the laser prep file, which is also disk resident and is downloaded before any fonts. What this means in practical terms is that only three or four fonts can be used in any one document, depending on the size of its PostScript file. Using more than this number of fonts in a document will cause the LaserWriter to refuse to print or it may just reset itself. In any event you get nothing. You may find that more fonts can be crammed into a document but it's best not to push your luck.

The great mix-up

This brings us to the great font mix-up. The Macintosh identifies all fonts by a three-digit code number between 1 and 256. Developers take pains to keep from assigning the same number to two different fonts. If, however, you purchase fonts from two different publishers you can get two fonts into your system file with the same number. This can have strange and unpredictable results. You may ask for one font and get another. You may just get a mess.

There are ways of digging into the fonts to change the number, but they are beyond the scope of this article. For those less technically inclined folks the only thing that can be done is to remove fonts from your system file until the problem is cured. Although this is not normally a big deal, it can cause headaches if you are not aware of it.

Of course, there are a few exceptions to the above rules. Certain fonts require very little memory because they only modify the fonts that are built into the LaserWriter. For instance, Century Software's Thin Times and Thin Helvetica take up only about 2K of memory, but a full font such as Calligraphy from Casady Ware may use more than 30K of memory.

Another exception involves *PageMaker*, a popular page-layout program (Aldus Corp., Seattle). *Pagemaker* handles fonts differently than other programs because it retains the downloaded font in the LaserWriter's memory only until it is finished with a particular block of text. It then flushes the font out leaving that portion of memory available for the next font. As long as you use only one or two fonts in each separate block of text, you can use an unlimited number of fonts in a given document.

You may think you would never need to use more than one or two fonts in a single document, but more often than not there is just not quite enough memory for what you want to do. This can make *PageMaker* a pretty valuable tool. A common problem with it, however, is that it likes to leave its own special laser-prep file in the LaserWriter's memory. This can cause the printer to give error messages if you print from other applications right after using *Pagemaker*. Usually a second print command is all that is needed to get things back in order. If all else fails, turning the printer off for a few seconds to reset it will solve most problems.

Finally, to use any downloaded fonts you must have the latest system software for your Macintosh. This means system file version 3.2 or higher, *Finder* version 5.3 or higher and *Font D/A Mover* version 3.2 or higher. Lower numbers will not work. The proper system files are available from your Apple dealer, usually without charge.

Apple's system software runs pretty smoothly. It is possible, however, to run into situations where the electronic conversation between the computer and the LaserWriter (which also contains a very powerful computer) breaks down.

In such a case everything seems to be normal but the LaserWriter will not print your document. When this happens, go back through the setup procedure for the LaserWriter. Disconnect the Appletalk network from the control panel and then reconnect it. Rechoose the LaserWriter from the chooser and okay a page setup again. If all else fails, turn off the whole system and restart it. Be sure that you save your document before shutting down.

The availability of a large number of fonts is quite new. Only a few months ago there was only a very limited number of fonts on the market. Now there are over 1,500 available from several different publishers.

These new fonts not only produce letters and numbers but special scientific and mathematical symbols, as well as clip-art items. Language fonts such as Hebrew and Greek can also be purchased. In fact, if you can't find the type font that you want, just keep looking. Someone is almost certain to make it. A good place to find fonts advertised is in such magazines as *MacWorld*, *MacUser* and *Publish*. Publishers of quality fonts include Adobe, Casady Ware and Century Software, among others.

Unfortunately, when Apple designed the LaserWriter it did not anticipate this flood of downloadable fonts. Currently the Macintosh system file can use only 128 fonts. Some software such as *MacDraw* can handle only a few fonts. This can create a difficult situation, requiring you to load and unload fonts to the system file to keep it from getting cluttered. Giving careful consideration to what you really need before you buy can save you some money as well as some font switching.

Beyond what has been mentioned you should have very little trouble with downloaded fonts. The important thing to remember is that there are limitations to both the hardware and software. As long as you do not exceed these limitations you can have a wide variety of type fonts and styles to suit your every need.

Whatever your needs, don't be afraid to buy downloadable fonts. Prices vary considerably from one publisher to the next, but all of them that I have used have been of very high quality. The only problem you may have is finding enough money to buy all of the fonts that you want and enough space to store them. **CU**

(Paul Williams is a free-lance writer.)

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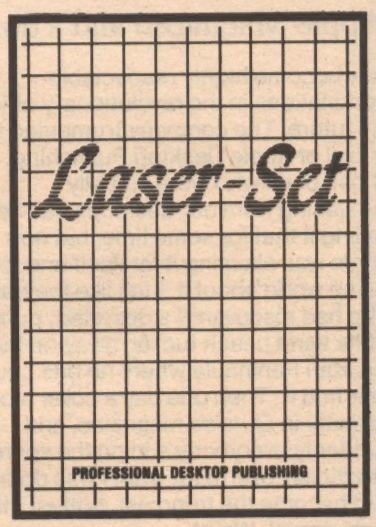

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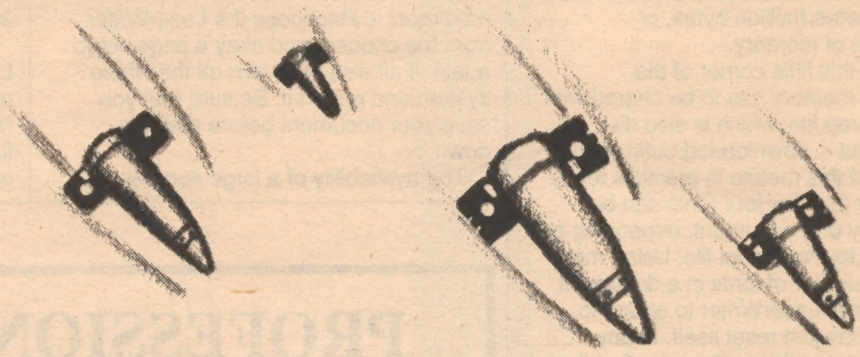
A VIEW FROM THE TRENCHES

Down and dirty with desktop publishing.

by Joe Feidt



TOM R. GARRETT

I love desktop publishing. I hate desktop publishing. Okay, I admit it, I'm a little schizoid about my work. But you have to understand, for the past year and a half I've been getting down and dirty with desktop publishing. I've been in the front lines so to speak, ducking my head in the trenches, waiting for the next bomb to drop. You see, every work day I use desktop-publishing technology to produce newsletters, brochures, display ads, sales manuals, even labels for champagne bottles. My business partners are a 512K Apple Macintosh and a dozen software programs.

We might as well get something straight right now: not too long ago, I thought a byte was something you took out of an apple. To me a hacker was a weekend golfer. My background is in writing, journalism and design, not computers. Back in the cut-and-paste days of 1983 I make newsletters for the Minnesota Frisbee Association. It was then I started to understand why people detest doing newsletters: The step-by-step process involves so many people and is such a hassle to coordinate that newsletters are often put on the back burner, then hastily thrown together at the last minute, usually by someone who would rather not do it. I began to see why so many company newsletters produced inhouse are often something less than letter perfect. My newsletter moonlighting was evolving from an avocation to a parttime job. Desktop publishing was a buzz phrase that had not yet been born. I didn't need or want a computer.

In the summer of 1985, with fear and loathing and lots of curiosity, I went over to test drive my brother's new computer, a 128K Mac hooked up to an Imagewriter. No external disk drive, no page-layout software, no LaserWriter, no nothing. Just a skinny Mac with *MacPaint* and *MacWrite*. After a few laps around the track, fear and loathing got thrown into the little trash-can icon in the lower right of the screen. Courage and true love suddenly replaced fear and loathing: I would get a Mac and use *MacWrite* and *MacPaint* to produce newsletters. My business was born that summer evening.

My heart sank several months later as I watched the evening news. Apple had just announced its brave new marketing thrust at the annual meeting in California. The cute little Macs would now become highly respectable workstations in the revolutionary office of the future. The company trumpeted the arrival of Apple Desktop Publishing. Those of us who were actually publishing from our desktops had been calling it that for some time, but now Apple was claiming it for itself and telling all the world about it. I felt like the traveler who had discovered a deserted, pure-white sand beach tucked away on the Yucatan Peninsula where no one could ever find it. Then one day a cover story appears in *Outside* magazine, and suddenly everybody's in on the secret. Practically overnight what I was doing had become the trendiest, hottest, high-tech marvel. Weird.

If we are to believe Apple's public-relations department, desktop publishing is more than just a hot segment of the microcomputing industry; it is the primary force that will determine the direction computers take in the 1990s. I think what it really does is give micros another reason for existence—especially Apple micros—and it gives the industry a needed shot in the arm. Apple is sending a message to American business and it's quite clear: don't get left behind. Buy your Macs and start to publish. Or ye will perish. Weren't they once saying every family needed a home computer?

Over in that corner you have the good word from the computer industry. Over here, in my corner, is the reality of using this new technology every day. Here are my views on the advantages and disadvantages of desktop publishing from the standpoint of someone who gets down and grovels in it every day. First, the good news:

• Appearance. With a computer, word-processing and graphics programs, a page-layout program and access to a laser printer, many people can now produce attractive, professional-looking, camera-ready pages. I use the word many because no matter how whiz-bang your page-layout program, you will need to have some graphic-design skills to make your pages look good. *PageMaker Portfolio*, a set of 21 templates for newsletters, is meant to solve this dilemma. According to Aldus *PageMaker* art director Laura Perry, *Portfolio* "essentially means that a user can produce a good looking newsletter painlessly."

Producing an attractive page is seldom if ever painless. It takes a sharp eye for detail, software know-how and lots of patience. I and other desktop publishers produce camera-ready pages that are then reproduced through conventional printing means. Desktop publishing is somewhat of a misnomer; it's really desktop production.

• Typesetting control. I enjoy the control I now have over typesetting. In the old days (pre-1985) I would make two or three or four trips to the typesetter as the manuscript went through the inevitable refining process. Now, if the changes are fairly minor, I can boot up *PageMaker*, make the changes, get a laser print and it's fixed. For more substantial editing, I have to go to my original *MacWrite* document, edit, then re-flow into my *PageMaker* document. In most instances the step of producing galleys for proofing is eliminated. The 300 dots-per-inch resolution that many laser printers produce looks a bit ragged under a magnifying glass, but the quality is good enough for most people. It may not be true typeset quality, but it's close. If I want the best, I can get it with an Allied Linotype typesetter, which has the ability to produce *PageMaker* files into higher-resolution typeset pages.

• Keylining control. One of the best things about a page-layout program like *PageMaker*, *Ventura Publisher*, *Ready, Set, Go* or Springboard Software's *Newsroom Pro* is that it's now easy to get text and graphics keylined straight. I cannot count the number of late-night cut-and-paste sessions when I would slowly go blind and crazy trying to line up the headers and text. Now text blocks, heads, subheads, rules and graphics can be placed on the page perfectly straight. And by keeping all production

services like typesetting and keylining inhouse, I reduce costs by about 40 percent.

• Flexibility. Almost any report, proposal, resume, flyer or newsletters now can be tailored specifically to any project. Why, for instance, should a company have only one company newsletter?

One of my clients publishes essentially the same newsletter for both his customers and suppliers, but we make minor changes in tone and replace one or two articles for each. We create two separate, more narrowly focused publications to fit the different needs of his customers and his suppliers.

The same is done on a broader scale with one publication being customized to serve several businesses or organizations. Desktop publishing is ideal for narrow-casting your message, because it's fast, flexible and inexpensive.

• Convenience. As more and more laser-copy services spring up, it's easier than ever to produce the final master page, the actual laser print. I do all the writing and page layout in my office, then take my disk to a laser-copy service and make laser prints.

From the laser print, I make photocopies or take the masters to an offset printer. Even though I may spend $100 a month on laser prints, it's hard to justify buying a $4,000 laser printer. Last year Apple cut the price of the LaserWriter by $1,000 and my fearless prognostication says look for still lower prices in 1987.

So that's the good news. The print quality, control, cost, flexibility and convenience are definite advantages that desktop publishing has over traditional production methods. I probably wouldn't be in business if I had to do it the old way, running back and forth among typesetter, keyliner, printer and client. But before you hang up your Acme Desktop Publishing shingle, you might want to consider the darker side of desktop publishing:

• Consider the following quote: "I don't know if I represent a large percentage of the Mac community, but I know this: I am really sick of hearing about desktop publishing. If desktop publishing is one thing the Mac does particularly well, fine. But the press seems to have snatched it up like a terrier snatches a rat and is determined to shake every last word out of it that can possibly be written. All desktop publishing does is encourage people with very little to say to write enough so they can fold one page over, or make it a four-pager and distribute it with mail merge to innocent victims. Who really needs it? Who is making all these newsletters? More importantly, who is reading them? Please spare us any more on desktop publishing." Sue Gelinas, Culver City, Calif., in a letter to *MacUser*, December 1986.

That's pretty brutal, but she's got a point. We may soon be buried in an avalanche of poorly written, badly designed publications. But it might not be all bad. These disposable publications could become an important new alternative fuel source. And a huge new market for paper shredders may arise. The truth is that until the ultimate word-processing program, which can transform a true hack into the Bard of Avon, comes along, you just gotta be able to write. And you must have an eye for design and detail or hope and pray that the designer templates can pull you through.

If your work doesn't look good, most people aren't going to bother reading it. Spell checkers will help you catch the big mistakes, and a good human editor can do wonders with rough copy. But if you want somebody to read your desktop publication, you better make it attractive and readable.

• Bombs away! If you ever have the opportunity to use *PageMaker*, you will at times know the true meaning of the word frustration. I am talking about a very strong urge to stab, repeatedly stab, the 3.5-inch *PageMaker* diskettes. Don't get me wrong. This is a very powerful and elegant page-layout program. It is also one of the most frustrating and infuriating creations in the short history of desktop publishing. He who does not follow the old banker's adage "save early and save often" will pay the price with the dreaded system-error bomb.

The bomb invariably falls when you're behind deadline or you have neglected to save for at least an hour. Of course, when the bomb falls it wipes out everything you've done since your last save.

PageMaker-formatted files need about twice as much memory as your actual document; If your document takes up 30K, you need about 60K of space, so you better have plenty of accessible disk space. I always have an empty or nearly empty storage disk in my external disk drive, so that when the "Save of publication stopped—Your disk is full" dialog box appears, all is not lost. Choose save from the file menu, then click on drive to open and save on your storage disk. This will rescue you from the disk-space problem, but it won't give you shelter from the bomb. Of course you MacUsers with the megabytes don't have this problem any more.

One big problem that isn't talked about much is that learning how to use the hardware and software is a long, dusty trail. Even a great, user-friendly computer like the Macintosh takes a while to get to know.

PageMaker is truly a many-splendored thing; becoming proficient and fast at using it takes many hours of trial and lots of errors. If the computer is such a time-saving tool why do I spend so many hours in front of it?

• The Mac's smaller screen size. At first the smaller Mac screen didn't bother me because it's high resolution and flicker-free, very easy on the eyes. But the computer, like love, has a way of turning minor flaws into major annoyances. How much time do we *PageMaker* users spend scrolling back and forth, up and down the page while in actual-size mode?

• Fear of buying. In our era of instant obsolescence, I find myself waiting for a $2,000 PostScript laser printer, for a dedicated desktop-publishing personal computer, for a fast and affordable scanner, and for a bomb-free page-layout program. A sort of consumer paralysis has set in as I make do with the tools at hand.

Hardware and software developments in this field are coming so fast and furiously, it is hard, really hard to keep up with the Joneses. Staying current with the latest and greatest desktop-publishing advances is tough—but fun. **CU**

(Joe Feidt is the owner of Dog Ear Publications, a Minneapolis-based desktop-publishing service.)

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DESKTOP TOOLS & GRAPHICS DESIGN

A look at what some local designers use.

by John Laney

Desktop publishing, a term coined in 1984 by Aldus president Paul Brainerd, has been, until recently, identified with Apple's Macintosh and LaserWriter printer. In January, Aldus released *PageMaker* for the PC-DOS universe. Apple still has a clear lead in this area, which it is likely to maintain. The Apple LaserWriter, a pivotal product in the desktop revolution, is barely two years old. 1986 saw an explosion of services and software products which support this growing industry.

I thought it would be instructive to find out what tools local graphics designers and artists in this new industry used most. I was interested in every aspect of the designer tool kit from hardware accessories to desk accessories, from applications to utilities. I hoped to learn which tools were considered indispensable, which hardware solutions improved productivity, and where the industry was headed from the perspective of end-users. I expected to find a consensus of opinion which mirrored my own experience. I did find a core of programs which were most frequently used but beyond that there was much diversity.

For most professional designers, desktop publishing has found a niche, but the old tried-and-true methods have not been completely abandoned. The new Gutenberg revolution may have begun but the ideal of start-to-finish computer control of design, layout, text, and art is largely a myth that should probably be enshrined along with the "paperless office."

In the end , I interviewed three working graphics designers in the Seattle area; all had publishing, printing, layout or graphic-design experience before the the advent of the Macintosh. At this point the Macintosh is a major contributor to productivity in their work.

This brief overview is not intended to be a complete picture of desktop publishing (a moving target, at best) but is, instead, a snapshot of current solutions used by people working in the industry.

Desktop publishing is an area of constant change. When I called back to check some earlier quotes, for example, I found that most of my interviewees had already made changes in their tool kits.

Laura Lewis

Laura Lewis at Jay Rockey, Public Relations uses *PageMaker* exclusively. An early user of the program, she counts Aldus Corp. as one of her clients. "For anyone who has a background in design, *PageMaker* is the most intuitive of the page-layout programs, she said. "I have to admit I have a bias in this area. I know *PageMaker* best, but from what I've seen of the others, there is no comparison."

Laura's tool kit is as follows:
Page layout: *PageMaker.*
Applications: *Excel, Word 3.0.*
Drawing programs: *MacDraw.*
Desk accessories: *Calculator, Wyzzy, ArtGrabber+, KeyCaps.*

Laura was an established graphics designer before she started using a Macintosh. She regards the Mac as a productivity tool. It has increased the turn-around time for typesetting and has given her greater control of the final product.

She and her staff make novel use of a Thunderscan (a device which converts the Imagewriter printer into an inexpensive scanner) to capture original line artwork and photographs as *MacPaint* files for use in page layouts. These images are not of acceptable quality for final reproduction but they can be easily imported into *PageMaker* as design elements.

"It's a compromise," Laura said, "but it's much faster than the old way of doing a complicated layout. It is especially useful for flowing text around art. We can also present a very accurate dummy to clients for approval."

When the final layout is ready for printing, the scanned graphics are deleted. The original illustrations are then pasted into the blank spaces in the text.

"Bit-mapped graphics are too crude for most of the things I do," said Laura. "They look 'too computer' and, with the exception of 'screen dumps,' we don't use them."

Object-oriented graphics offer an improvement. Graphs created in *Excel* are imported through the clipboard into *MacDraw* for improving, before being pasted into a *PageMaker* document. Object-oriented graphics have the advantage of smoother scaling, better print quality, and they print faster than their bit-mapped counterparts. *MacDraw* is also used for rotating text (in 90° increments), a feature not currently available in *PageMaker.*

Kathryn Garrison, a designer who works with Laura, uses a small group of desk accessories with *PageMaker. KeyCaps* is useful for locating special characters. She also uses *Wyzzy*, a desk accessory from Aldus which corrects for some of the differences between the screen display and the final output. (This desk accessory works with the current version of *PageMaker* and should not be necessary with version 2.0.) The *Calculator*, which comes with the system disk, is used for totaling columns and for making other calculations. *ArtGrabber+*, a utility from Silicon Beach, is employed to cut and paste selections from larger *MacPaint* documents. (*PageMaker* has the ability to paste and then crop any *MacPaint* document. Since it imports entire *MacPaint* documents, cropping multiple pictures from a single file is not practical. The alternative is to create a separate *MacPaint* file for each image.)

Jack Connick

Jack Connick is a graphics designer, computer consultant and author. A dedicated Macintosh enthusiast, he has more current software than the average Macintosh user. He was a beta tester for ReadySetGo 3, which he preferred over *PageMaker* 1.2. His present toolkit is listed below.
Page layout: *Ready-Set-Go, PageMaker 2.0.*
Applications: *Excel, Word 3.0, MacWrite, SmartCom II, Macify 2.0.*
Drawing programs: *MacDraw, MacDraft, CricketDraw, SuperPaint.*
Desk accessories: *MockTerminal, MockWrite, SkipFinder, DiskTop, Acta, Tempo, LaserQueue, SuperRuler, Clipboard Edit.*

Jack acknowledges *PageMaker*'s leadership, but thinks *Ready-Set-Go 3* is more useful to designers for certain kinds of layouts. He said it is a good value, and now that Manhattan Graphics has been purchased by Letraset, it should be around for some time to come.

"I'm currently re-evaluating my page-layout software and will switch to either *PageMaker 2.0* or to Quark's *XPress*," Jack said. "Both have a much better interface and greatly enhanced features. *Ready-Set-Go*'s user-interface has too many problems which get in the way of doing professional-level work. The vest pocket of the market has finally caught up with it feature-wise.

"My greatest gripe with the industry is the lack of good typefaces. Adobe has been too slow getting them out. Many of the ones they have released are out of date. Besides that, they are incomplete and overpriced. A good font should have six or more weights and styles, not two-four like the ones available from Adobe. I'm hopeful that Letraset, which has a lot of experience in the area, will provide more now that they are coming into the market."

Jack uses both *MacDraft* and *MacDraw*, because each has certain features lacking in the other. "I like *SuperPaint* for doing roughs," he said. "It has great text features and the combination of both bit-mapped and object-oriented graphics is very powerful. *CricketDraw*, which I've used for only a short time, seems to be a useful product and worth its $179 (mail order) price tag. It is the first of the PostScript drawing programs and allows you to turn a drawing into PostScript code. Unfortunately, if you edit the code, you cannot display the results."

Like most designer I spoke with, Jack is interested in Adobe's new PostScript drawing program, *Illustrator.*

Among the desk accessories he uses are *MockWrite* from CE Software, a text-only word processor that can run concurrently with *Ready-Set-Go* or any other application, and *Mock Terminal* for telecommunicating. Jack also uses *SkipFinder*, a desk accessory that allows for quick launching of applications without returning to the Finder; *DiskTop*, which gives the user the ability to do things like rename and delete files from within an application; *Acta*, an outliner; *Tempo*, a macro creator recommended by Manhattan Graphics for use with *Ready-Set-Go*; *LaserQueue*, part of SuperMac's *SuperSpool*, a laser printing utility which reduces the time the computer is tied up printing; *Clipboard Edit*, handy for text editing—all caps to word caps, etc.; and finally, *SuperRulers*, a shareware desk accessory that can be used with most layout and drawing programs. *SuperRulers* provides a flexible measuring device keyed to screen and output resolutions.

Macify, a program that is very useful to anyone doing page layout is a shareware gem. It can take text files and add the Macintosh's special characters and, at the same time, strip out any control characters. It is especially useful for converting files created by other types of computers.

Tim Celeski

Tim Celeski of Tim Celeski Studios is a designer and typographer. Having gone full circle from designing with the Macintosh, he now finds himself designing

user interfaces, icons, and manuals for various Macintosh programs. Examples would be his work on Microsoft's *Word 3.0* and *SuperPaint*. He is also the president of dBug, (Downtown Business Users Group), a Seattle Macintosh user's group.

Tim is a Mac evangelist without portfolio. He has taken his Macintosh where the faint hearted never dare to tread. Tim's Mac has been through several upgrades, and it sports a self-installed Levco MonsterMac and a homemade video interface. (His Macintosh, unlike the ones that come from Cupertino, can generate a video signal to a TV set or another monitor.)

He has also added something few Mac users enjoy, a graphics tablet as an alternative to the mouse. The mouse, from an artist's point of view, is a terrible drawing tool. A pen-like stylus is much more natural to use. The tablet is 12 inches square and is sensitive to the tip of the stylus. A button on the pen (or, alternatively, a spring-loaded switch in the tip) replaces the mouse button. The tactile feedback is similar to the drag of a pencil on paper.

Tim uses *SuperPaint* for logo and icon design, *GraphicWorks* for illustration, *MacDraw* and *MacDraft* for technical line drawings, and *CricketDraw* for charts. He uses *Word* for text processing and *PageMaker* for final assembly and printing. No single program combines all the features a graphic artist needs.

Here is Tim's tool kit:

PageLayout: *PageMaker.*
Applications: *Excel, Word 3.0, Switcher, MacDraw, Fontagrapher, RamDisk+.*
Drawing Programs: *GraphicWorks 1.1, MacPaint, SuperPaint, CheapPaint, Mockwrite, Pro 3-D, Adobe Illustrator.*
Desk Accessories: *SuperRulers, Multi-Scrap, Pop-up Menus, Wyzzy.*

Tim is the only person I spoke with who consistently uses a RAM disk and *Switcher*. Because *MonsterMac* provides increased memory (two megabytes) and a high-speed processor, it is a perfect vehicle for using a RAM disk.

A RAM-disk program allocates space in memory (RAM) and loads it with the user-defined applications. From the Macintosh desktop it appears as an extra disk drive. However, because this "disk" exists in RAM, it is much faster than ordinary disk drives.

One of the shortcomings of using the Mac without a hard disk is the need to have a System and Finder on each startup disk. This means a lot of duplication and wasted disk space. One solution is to place the System and Finder in a RAM disk. This frees up the internal disk drive for data or applications—something that's especially important if you have only one drive. In most cases this will make the application run faster, too. With two megabytes (million characters) of RAM and a 40 megabyte hard drive, Tim has lots of space to play around with. He has a separate RAM disk configured for different applications. One RAM disk might hold the Finder, Laser Prep, and LaserWriter driver in addition to a full system with all the fonts and desk accessories he needs. For some applications the RAM disk is combined with *Switcher*.

One desk accessory Tim gets alot of use from is *Multi-Scrap*. This tool allows him to open a scrapbook on any system disk. *Cheap Paint* from Silicon Beach also has this ability and is also useful with *PageMaker* as the poor-person's *MacPaint*. Like all desk accessories, it is available without quitting the current application. *PageMaker* has very limited drawing capabilities and, although bit-mapped graphics are limited, when they are needed it is much easier to create them without quitting the program

Output limited

Until now, the graphics-based Macintosh could not produce images suitable for production artwork. Although everyone I talked to owned a couple of drawing programs, these were rarely used for final production artwork.

In the last year, several new bit-mapped drawing programs have been introduced, each an improvement on the last. The drawing tools have improved but the final output is still only 72 dots per inch. The LaserWriter, which is capable of 300 dots-per-inch resolution, prints approximately 16 dots for each one dot in a full-size bit-mapped picture.

Improvements on the bit-mapped front include high-resolution scanners which use the new TIFF (Tag Image File Format) standard which is supported in *PageMaker2.0* and *GraphicWorks*. Princeton Graphics developed the engine for these fast and memory-hungry devices. They can produce half-tone graphics comparable to those found in newspapers but make owning a hard disk for storage a necessity.

Object-oriented drawing programs like *MacDraft* and *MacDraw* are being used for graphs and charts and for rotated text, simply because they are the only products that will do the job.

Desktop Eldorado

I think all my interviewees would agree that no single existing program can do everything. Such a program is theoretically possible. The compartmentalizing of applications results from the lack, and relative expense, of large memories on the one hand and the development time needed for complicated multitasking programs on the other.

All my interviewees saw the need for greater compatibility between applications. For example, I expected to find more customized systems using Switcher or a RAM disk, but there seemed to be a reluctance to use these programs. (Two new computers this year and three system revisions from Apple in the last 12 months—another one on the way for network users—have not contributed to compatibility.) In general, customized configurations were avoided as another thing that might cause problems. It might take a little longer to quit one application and launch another, but at least one more possible cause of data loss is avoided. **CU**

(John Laney is a Seattle-based Macintosh illustrator and owner of Desktop Graphics.)

Drawing In PostScript

Two new drawing programs have recently been introduced which directly address PostScript printing devices in their own language. They are Adobe's *Illustrator* and *CricketDraw* from Cricket Software. Each has its strengths and omissions.

CricketDraw has the ability to ramp gray scales. It can create a smooth transition of values across any of the objects it can create. The user defines the beginning percentage and the ending percentage and the direction they are to intersect, and the program does the rest.

On a high-resolution printer such as the Linotronic 100 typesetter, they produce almost seamless transitions. *Illustrator* cannot do this trick automatically, but it can be accomplished manually, although the results will not be as smooth.

Illustrator has a terrific freehand drawing tool, not found in *CricketDraw* but omits useful features like the arrange-on-a-line function found in *Draw* and *Draft*. Both new programs are intended to create specialized kinds of artwork that can stand alone but which, in most cases, will be imported into *PageMaker*, *Ready-Set-Go* or one of the newer page-layout programs.

Both programs have the potential to replace *Draft* or *Draw* but the publishers seem disinclined to add the necessary features.

—J.L.

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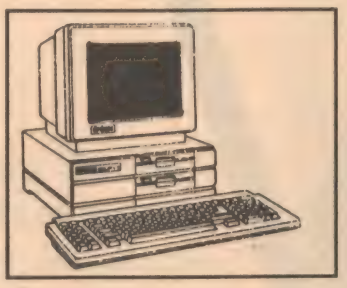

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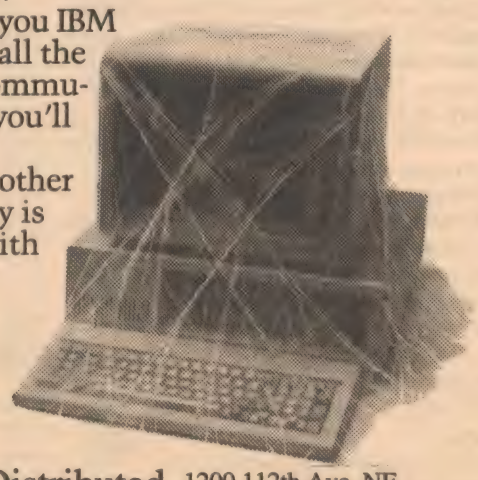

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SHOWING YOUR BEST SIDE

A primer on business graphics.

by Eric F. Johnson

Well-made graphics can jazz up a business presentation, show complex relationships in a new light and hide past mistakes. Presentations with graphics look more professional than those that rely on tables and tables of numbers. While business professionals have used graphics for years, only recently have computers emerged as the low-cost solution for graphics presentations.

Computers are a natural for business graphics—especially since much of the data used in graphs is already stored on the computer, in the accounting system, for example. Computers work well with numbers (everything is a number to the computer) and can do the tedious task of plotting points on a graph with ease.

Personal computers, such as the IBM PC and the Apple Macintosh, have brought down the price of creating professional-looking graphs. In fact, your system may already be set up to produce business graphs now, with packages such as *Lotus 1-2-3*. *Lotus 1-2-3* has the ability to create a few limited graphs, but most people will want a more sophisticated system.

Usually, business graphics are used to show large amounts of data in an easy-to-understand manner, to make informal presentations of data to peers and for more formal presentations.

One of the greatest problems you may have is wading through all the available equipment, as vendors have discovered that business graphics is a rapidly growing field. For instance, Dicomed Corp. of Minneapolis recently introduced *PresenterPC* business and presentation software, which allows users to create different charts (including standard-deviation and error-bar scientific charts) in a variety of sizes, color and leading; word slides in a variety of typefaces and sizes; automatic formatting and labeling functions; and "autobuild," which allows a user to instantly create a sequence of slides, all with perfect registration. *PresenterPC* will output to high-resolution color printers, laser printers, a video-presentation system and presentation-quality film recorders. It sells for $995. All the same, *PresenterPC* is just one of many software titles in the marketplace begging for your attention.

In choosing software to produce business graphics, you will need to decide which features are most important and what type of presentations you would like to make.

Five questions

When looking for business-graphics software, here are five questions to ask:

• What hardware is needed to run the software? Some of the most beautiful graphics on personal computers can be made with AT&T's TARGA board. But these great graphics require an expensive special-graphics board and a special (again expensive) graphics monitor. The best graphics software is useless if you cannot run the program on your system. Especially with PCs, check that your system is supported by the graphics software—before buying.

For IBM-compatible PCs, check the graphics-display adapters (devices that control a monitor) that the software supports. The three most common graphics display adapters are IBM's CGA, or Color Graphics Adapter; IBM's EGA, or Enhanced Graphics Adapter; and the Hercules (monochrome) adapter. Most software packages will support at least one of these adapters, if not all.

• Can it take in data from somewhere else? If you plan to graph large sets of complex data, chances are you have already entered that data into the computer for use with another program, such as an accounting package or a spreadsheet (most probably *Lotus 1-2-3*).

No one wants to type in large amounts of data again, so the software needs to be able to import, or take in, this data you have already stored online, and then graph the data.

Some common PC formats for storing data on disk include: WKS—Worksheet files for *Lotus 1-2-3* and *Symphony*; DIF—Data Interchange Format, also from Lotus; SYLK—Symbolic Link from Microsoft, used by *Multiplan* and *Chart*; DBF—Data Base Files from Ashton-Tate's *dBase II* and *III*; ASCII (comma delimited)—ASCII, a standard way to store text, is also used by *dBase III*.

The software package you choose should be able to take in data from at least one of these formats, preferably the one you use to store data.

• Can it make the graphs I want? Once the data is entered into the software, you will want to make graphs. Graphs are, of course, the purpose behind graphics software. Unfortunately, most business-graphics packages are severely limited and will only put out a few types of graphs, usually bar charts, pie charts, line graphs and scatter plots.

These simple graphs may be enough but sometimes you will want something with a little more oomph. If you want to display more relationships among data, try a three-dimensional graph. *Perspective* from Three-D Graphics is one such product that allows you to display 3-D bar graphs from any perspective. The results are visually stunning and you can see new relationships in the data.

• How hard is it to make the graphs I want? The flexibility of a software package is important. No one wants the software to box them in and severely limit the choices for graphs. Some things to look for include merging in text with graphics, putting more than one graph on a page and altering a graph you have already made.

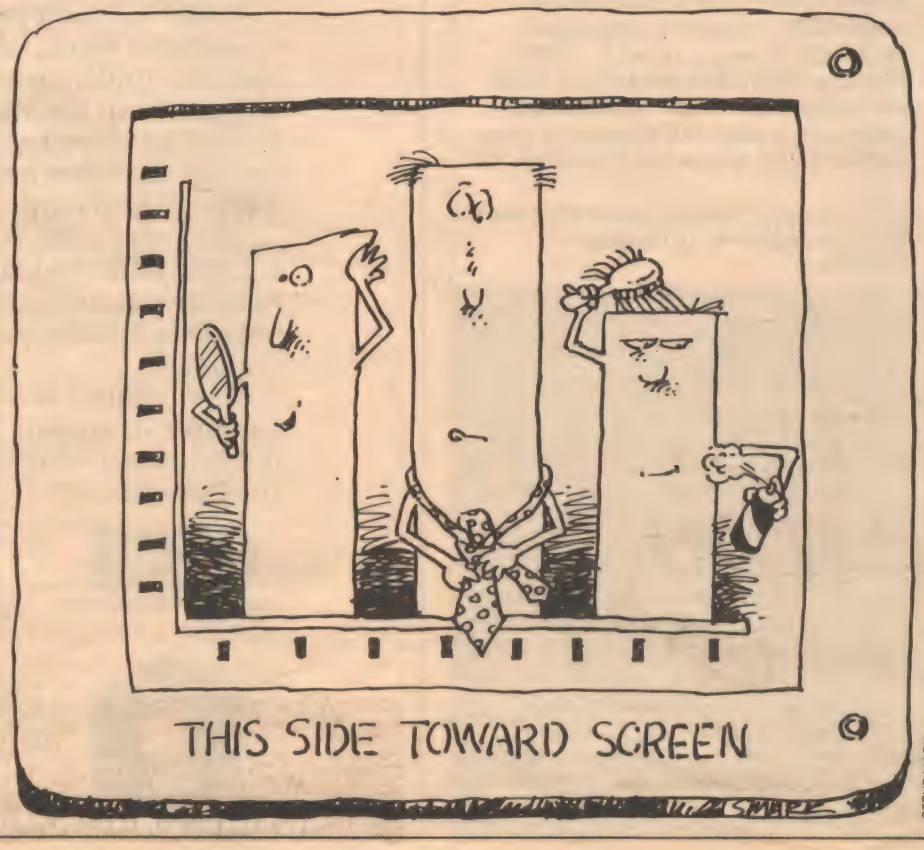
Lotus *Manuscript*, a new word processor for the technical/engineering crowd, allows a user to place text with graphics, as well as more than one graph, on the same page. Other packages allow this, but many do not.

• What can be done with the graphs it makes? Once all the graphs are made, what can you do with it? Usually, you will want to display the graph in some manner, on the printed page, on a slide, or just on your monitor.

Monitor screen

Using the monitor screen is probably the easiest way to display graphs. Virtually all graphics software packages support drawing graphs on the monitor screen—if only to give you an idea what your graph looks like before you print it out.

Monitors have advantages over other forms of output in that you can instantly change graphs, the monitors have a higher resolution than many dot-matrix printers and many monitors can display graphs in color.



STEVE MARK

Special animation effects are another advantage of using the computer monitor. With a program such as Microsoft's (or Brightbill-Robert's) *Show Partner*, you can create a show that will display a set of screens in order with limited effects such as fade-ins, moving titles and so on. The result can be an impressive display, and best of all, the software comes free with the Microsoft Mouse.

A disadvantage of using monitors is the small size (usually 12-13 inches diagonally). Larger monitors (19 inches and larger) carry exorbitantly high price tags.

One way around the size problem is to use a projector to enlarge what is on the computer screen onto a wall. Telex Communications recently released MagnaByte, a $1,200 unit that sends what is on the computer screen to an overhead projector. With a product like this, you can have the advantages of the monitor screen (high resolution and the ability to change graphs) and still be able to display the results in such a way that others can see as well.

Another disadvantage is the special equipment you need to display the graphs—a computer, the monitor, the correct display-adapter card and so on. It is often a great inconvenience to set up all this equipment—and there is always the danger that something will not work correctly, turning your perfect presentation into a clumsy flop.

Printers

Using printers to put graphs on paper is the most common method of displaying business graphs. In the past year, dot-matrix printers have markedly improved in quality and resolution—making your graphs look all the better. Laser printers greatly increase the quality of output, more so if text is included with the graphs.

Color printers have recently entered the affordable market. Okidata Corp., for example, sells the Okimate 20 color printer for about $200. Color printers still have some bugs to be worked out (long delays in printing the picture, high use of ribbons and poor quality).

Another color printer that's been released to rave reviews is the Xerox Model 4020, priced at $1,495. It offers a resolution of 240 -120 dots per inch (dpi), made possible by a 20-jet printhead. (In comparison, laser printers output documents with a 300-dpi resolution.) However, to take advantage of these color printers, your software must contain a printer driver that will give correct instructions to the printer.

Slides

Most people use printers or plotters to output their business graphs, but a recent study by 3M and the University of Minnesota shows that using 35 millimeter slides creates the feeling that a presentation is more professional. Using computer-generated slides is still a new idea, but a number of products are available, from the Datacam 35, by Photographics Sciences Corp. at $900, to the $14,000 Matrix MVP-PC/PCR from Matrix Instruments.

The most popular slidemaker is the Polaroid Palette Plus, which gives enhanced-graphics adapter resolution for $3,000. All these products reproduce what is on the PC's monitor screen onto a color slide. If your company cannot afford the high start-up cost of making slides, many service firms can make them for you.

Overhead transparencies

Overhead transparencies always seem to be overused by boring speakers, perhaps because they are so easy to make. You can substitute special transparency sheets for paper in laser printers and photocopiers to make monochrome displays. Plotters can produce color transparencies, and so can service companies that specialize in business graphics.

In addition, a whole new peripheral field is popping up around overhead transparencies. For instance, Forethought of Sunnyvale, Calif. announced *Powerpoint*, a desktop-presentation package for the Macintosh, in March. Priced at $395, *Pinpoint* creates overhead transparencies and slides by combining menus, word-processing and other possibilities. A overhead transparency can be produced by a laser printer, while slides can be output on a film-recorder peripheral, which sells for $1,000. In announcing the package, Forethought president Rob Campbell said that in 1985, more than $6 billion was spent on slides and overhead transparencies. He added that by 1990 the market for desktop presentations will rise by 1,000 percent. The credibility of *Powerpoint* was enhanced when Apple president John Sculley called it "the *PageMaker* of the presentation."

Electronic copyboards

Electronic copyboards are a relatively new item. These boards act much the same way that a chalkboard does, except that at any time, you can press a button and get a copy of what has been written on the board. This eliminates note taking. With some boards, the image can also be sent to a PC screen, and from there, transfered almost anywhere.

As things stand now, these boards are usually too expensive for any but larger companies. **CU**

(Eric F. Johnson is a contributing editor and designs systems for Prime Automation.)

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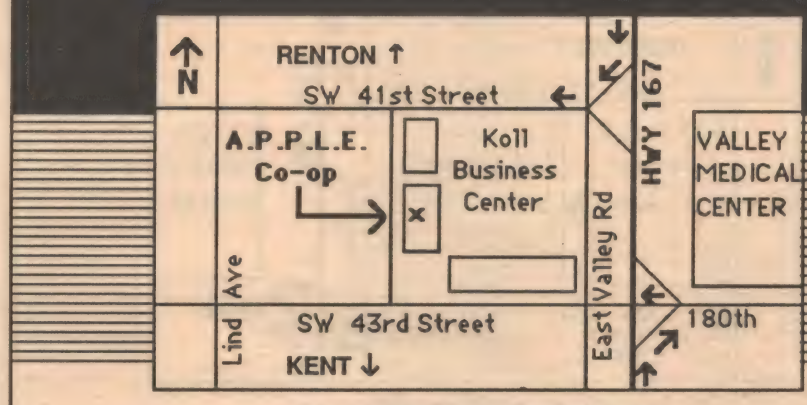

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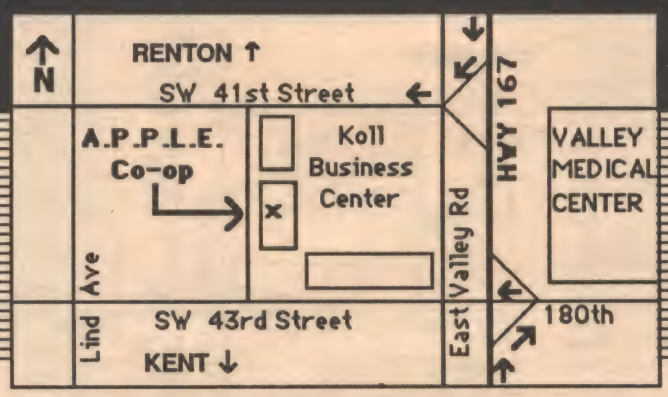

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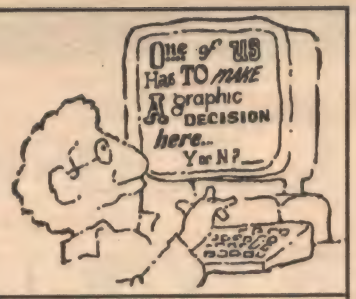

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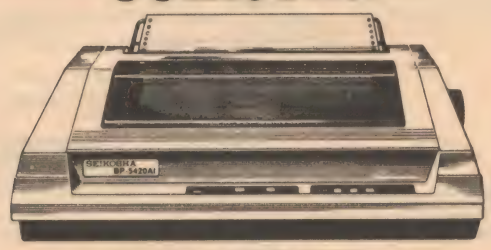

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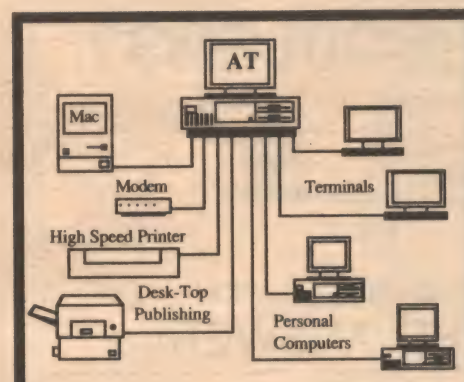

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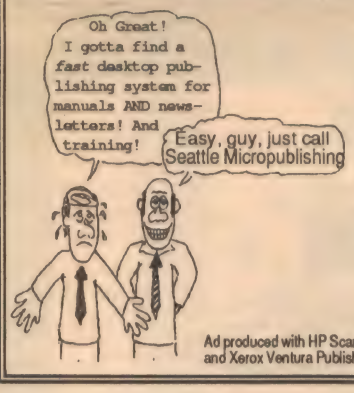
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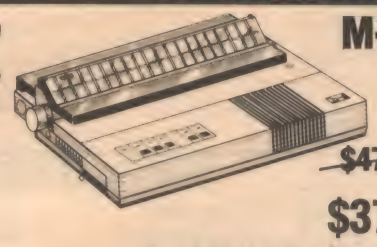

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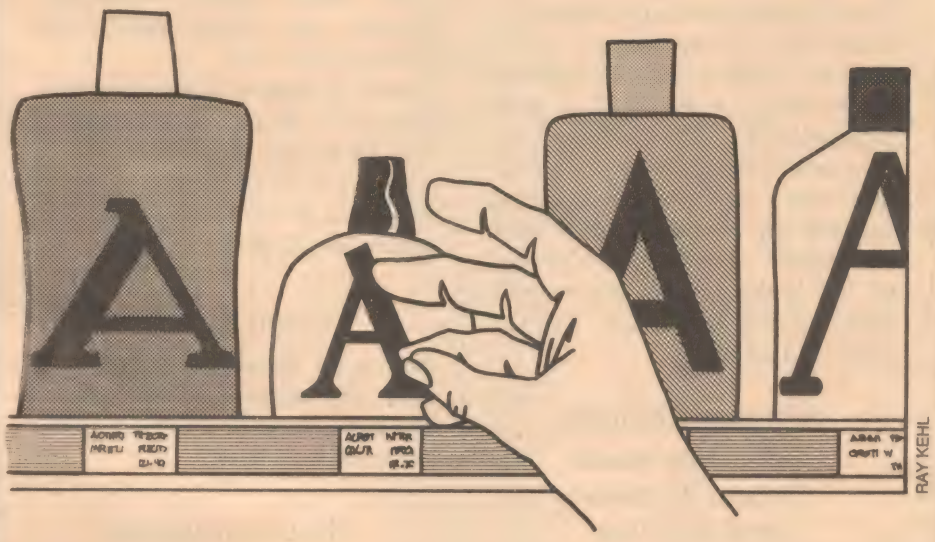
Choosing a typeface



Designing the look of your newsletter or brochure.

by Les Metz

Making a good decision is always more tricky when you don't know the rules of the game. There is, of course, the joy of becoming better-informed.

Think of desktop-publishing practitioners as people who have not had their own equipment before, do not think of themselves as experienced in typographic skills and are not primarily engaged in publishing. You can assume there'll be a high level of learning through trial and error and, at the beginning, some very awkward type arrangements. But there are rules of the trade that can be helpful, once learned.

After copy has been written, and before typesetting can begin, someone chooses a typeface. (A typeface is the shape of the letter. This article you're reading, for example is typeset in the typeface Helvetica.) In the more traditional world of publishing this might be done by the managing editor, the graphic designer or the typesetter. In many instances the selection would be made in consultation. In the desktop-publishing world those three roles frequently are wrapped up into one. Style, content, and design all rest with a single individual. There is a growing overlap between creation and production.

Type, properly used, can invite or discourage readership; it can make the difference between a piece that is aesthetically pleasing and one that is disharmonious and jolting. The choice of a typeface is not difficult if you have only two or three fonts to choose from. (A font contains all the technical information about different letters in a typeface family.) It becomes more complex when you are confronted with a myriad of names, most of which are unfamiliar. Apple now advertises 11 typeface families that are built into the LaserWriter Plus.

There is a way in which choosing a typeface is like selecting a nice wine to go with dinner. Some wines go better with beef and some go better with fish. And yet, to the untrained palate, wine is wine. There is no precise language that enables us to describe the differences in taste between a Burgundy and a Bordeaux. We talk about wine being dry or sweet, heavy or light, smooth or sparkling, and with a special bouquet. But only by tasting a wine do we know what the flavor means to us. And through knowledge and experience we identify our likes and dislikes.

There are typefaces that work well in a newsletter and others that may be more appropriate for an annual report. But to the untrained eye, type is type. All of it looks pretty much alike. It's difficult to explain the difference between Times Roman and Tiffany. You can talk about the texture of a typeface—its lightness or boldness, the variations in the thick and thin elements of the letterform, the shape of the serif and its overall appropriateness to the subject matter—but you have to taste it; to work with a face and know something about it before it becomes your own.

Type design is very conservative. You learn the shapes of letters at a very early age in elementary school or even in kindergarten. Type designs for letterforms cannot stray far from the accepted familiar shapes without impeding readability. The differences between one face and another can best be seen in terms of subtle detail. But that apparently insignificant detail in the individual letter becomes quite pronounced when viewed as a page of type. The difference is similar to the relationship between a single stalk of wheat and a field of waving grain.

Being uncertain in the selection of a typeface, you often can proceed by adapting the face and layout of a previously printed piece you particularly liked to the immediate task at hand. Or you might select from a menu a preprogrammed format that already has the face and typographic decisions all worked out for you. But as you gain skill and confidence this approach becomes less and less satisfying.

Typography is an art and a craft. Letterforms in and of themselves have beautiful and graceful shapes, and when used with appropriate spacing and care, combine to create artistically pleasing effects. And, because type is mechanically composed and subject to mechanical limitations, typography is also a craft. There are very practical

considerations as well as artistic judgments that enter into the planning of a well-printed page.

In any study of letterforms, knowing what to look for will focus your attention on those elements that are critical to the overall design. I have noted below some of the qualities of type design that can be helpful in comparing faces and narrowing down the choices.

• Set width. Letters have two dimensions, height and width. Type size refers to the height of a face in points measuring from the top of the ascender to the bottom of the descender. But the length of the alphabet (width of letters) varies from typeface to typeface within any given size. In an 18-pica line (3 inches) you can set 51 characters in 11-point Times Roman, but only 45 characters in 11-point Helvetica, and that figure drops to 42 in Trump Mediaeval. The difference in the amount of copy that can be set for an eight-page newsletter or 48-page manual can be quite significant depending on the face chosen. Set-width also can be a vital element when planning copy for, let's say, a small display ad.

There is a generally held view that narrow types work better in narrow columns for reasons of harmony and fewer word breaks. One criterion, then, is how well the type will fit the space.

• Serifs. Typefaces can be arranged into two large categories, serif and sans (without) serif. The serif face is characterized by the small spur appearing at the end of the main stroke and a variation in the thick and thin elements of the letterform. The sans-serif letter traditionally has no such spur or flair at the end of the stem and all elements are more or less of uniform width.

Of the two categories, the serif face is the more important; it has a longer heritage and offers a greater variety of choice. For the hundreds of serif faces on the market there are only three basic patterns for the shape of the serif: old style, a slanted serif bracketed to the main stroke; transitional, a horizontal serif bracketed to the main element; and modern, a very thin horizontal serif meeting the main stroke of the letter at a right angle. The slab-serif or square-serif "d" is normally associated with the sans-serif face.

The shape of the serif is a useful criterion for grouping or classifying faces and for identification. Recognizing the elements that are similar and those that are different in type design gives us an added familiarity and understanding of the work of the typographer.

Serif and sans-serif faces can often be used together effectively in the same publication but usually one is ill-advised to mix two or more serif faces in the same piece.

The sans-serif face is thought of as a clean, simply constructed, functional design. The color of the type page is more of a monotone. Serif faces tend to have more personality and flair, adding a unique quality of texture to the appearance of the print. The size and shape of the serif becomes a significant consideration in type selection for reasons of readability and mood.

• Thick and thin elements. Before the advent of printing, scribes laboriously copied manuscripts with pen and ink. The angle of the pen and pressure on the point naturally created variations between thick and thin elements of the letter. Early type cutters used the work of the scribe as a model in creating metal type. The invention of the printer was a form of mechanical writing using the best letterforms of the day.

Among the serif faces, letters with a gradual transition between thick and thin elements tend to be more readable in text sizes. Forms with a marked contrast and a heavy stem can be used very effectively in advertising because of the drama and interest this adds to a face but when set as standard text, they tend to set up a vibration on the page that disturbs readability. Such faces also benefit from additional leading—spaces—between lines because of the strong vertical stroke pulling the eye downward.

Variation in the individual letterform, then, affects the color of the page, readability, legibility and overall effect.

• Appropriateness of the typeface. Choices are frequently made by comparison. You consider all of the possibilities, compare one face against another, and finally settle on the one you think will work best.

Some typefaces appear bold and brassy, others quiet and sedate; some are dark, some light, some simple, others ornate. Experienced typographers look for a connection between the content of the copy and a typeface. Type is the bridge between the author and the reader.

When the Limited Editions Club of New York set out to publish a new edition of Shakespeare's plays, the typographer, Bruce Rogers, looked for a bold, vigorous face that reflected rugged Elizabethan life. He selected Janson, a type that was cut at about Shakespeare's time, in the early 1600s.

Our sense of symbolism and the meaning that we assign to all forms in our society is carried over into the field of typography. We see strength in a cement pillar and gentleness in a flower. There are strong, black faces appropriate for an ad about heavy machinery, and there are delicate letterforms more suitable for the announcement of a new perfume.

Whether it is the shape of the letterform, historical connotations or subjective judgment, after due consideration you will settle on one face that you deem most appropriate.

• Aesthetic judgment. Sometimes there are no clear answers and you arrive at a typographic solution based on your own artistic sense. You feel comfortable with a particular face; you can't always explain why, and there's no reason to do so. Having been exposed to graphics and printed matter from an early age, there are things you know intuitively about layout and design without being taught. Your artistic judgment is constantly being sharpened by viewing good design. But also, you should not forget that there is a five hundred-year heritage of typographic skills that should not be ignored. **CU**

(Les Metz is director of the printing and graphics arts department at the University of Minnesota.)

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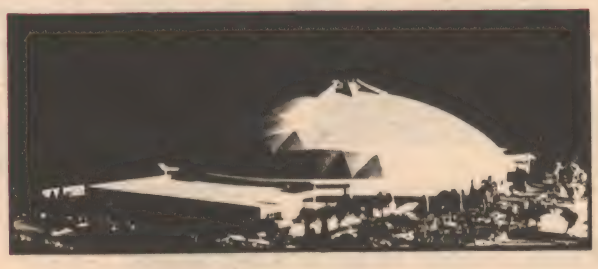

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Toward a common tongue

Breaking the language barrier with device drivers.

by Scott Olejnicak

Many, many years ago, as the Bible story goes, all people of the Earth spoke a common language. Every individual and family group could easily communicate with everyone else. This global compatibility made peace and issues of standards simple to set up and maintain.

But, due to its pride, humanity was punished with a "confusion of tongues." Suddenly, one group could no longer communicate with another. Mankind separated into tribes, cultures, and nations. War, mistrust and a general incompatibility began. A great babble arose over the face of the Earth.

Today's computer industry has a confusion of tongues that makes the problems of Babel look elementary. The result, as in the story, is that one group (or component of a computer system) is unable to speak the same language and communicate directly with another.

Talking in tongues

Every electrical component of a computer system, in a way, speaks a different tongue. The computer "talks" to the monitor quite differently than it "talks" to a disk drive, for example.

Each element of a computer system, then, as well as every software package and peripheral piece of equipment, needs a special translator. Today's translators are called device drivers.

Device drivers are software programs used to control peripherals. ("Device" is just another term for peripheral.) The operating system for the IBM-compatible computers, MS-DOS, comes with the drivers for the standard system hardware (disk drives, keyboard, monitor, ports). If foreign devices are added to the system (with qualities different from those created by the computer manufacturer), the device driver software must be added to the system through the CONFIG.SYS file. (This is a special file with configuration information that's loaded every time the operating system is loaded.)

The ANSI.SYS file is a standard driver that enhances the color display capabilities of a monitor. (In DOS, every driver has the .SYS extension.)

Every software program is unique, not only in what it does and how it does it, but also in how the program interfaces to the computer, the printer, and any other peripheral device (such as a mouse or a modem). Every new program, be it a data base, spreadsheet, or word processor, requires custom device drivers to interface with the various devices.

Software developers must write these special software routines for each output device so their program can fully utilize the features of the device. Every printer has peculiar characteristics that the software must be instructed how to use.

Thus, when margins or tabs are specified from a word-processing program, for example, the device driver translates them into device-specific instructions. When you call for bold face, your monitor may show bold face on the screen while your printer types bold face on the page. It's the device driver that handles these basic command translations; they give special instructions to the operating system on how to operate the specific peripheral hardware.

Typically, when a new program is loaded and installed, the program will ask you what kind of output devices you have (color monitor, graphics card, plotter, laser printer, letter-quality printer, etc.) and what kind of input devices (mouse, graphics tablet, scanner, etc).

A first-time user answers the questions, chooses a particular printer from the selection offered, and the program saves that information in a configuration file. After the configuration is established, every time the user runs the program, it automatically loads the appropriate drivers.

Most popular programs come with a full array of device drivers, so that the potential purchasers can install the program and know that it will work with her or his mouse and printer. Typically, device drivers come with the program; but with some programs, device drivers, especially those used to drive special machines such as laser printers or monitors, cost extra.

Generally, an established software package such as *Lotus 1-2-3*, *AutoCAD* or *PC-Write* will have drivers for all popular printers, and often for many not-so-popular printers. That ensures that a prospective customer will be able to purchase the program and immediately be able to fully use the capabilities of a specific printer from the software.

If a specific driver has not been written for your applications software, you still can output to your device using emulation. Most printers, for example, are able to emulate (or work like) a more standard device, such as the Epson, Diablo 630, or Hewlett-Packard LaserJet printers. You can use these drivers to operate your device "as if" it was one of these more popular printers. You may not be able, of course, to use some of the more uncommon features.

Device independence

Adobe Systems' PostScript page-description language gives a user something called "device independence." Device independence means that any file created within a certain environment can be output to any device that can accept files from that environment. If your software program has a PostScript driver, then you can output to any PostScript-compatible printer. Only one device driver is necessary: for PostScript itself.

Device independence is one of the big selling points of Microsoft *Windows*. Software developers writing programs that will run within the *Windows* operating environment don't have to worry about also writing device drivers: This has already been done for them. Any program that is designed to work with *Windows* can automatically use the large number of drivers already written for the program.

The choices are staggering. To choose software and make sure that software will run on your system and with your printer, mouse and other peripherals is not getting any easier. And as new and better programs in computer-assisted design, word processing and desktop publishing become available, and as laser printers and input devices become standard, device drivers can become an important consideration. **CU**

(Scott Olejnicak is a free-lance writer.)

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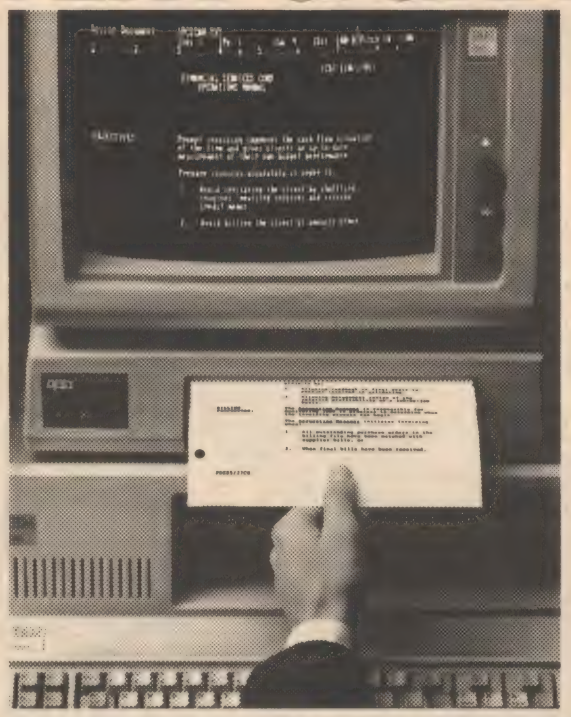

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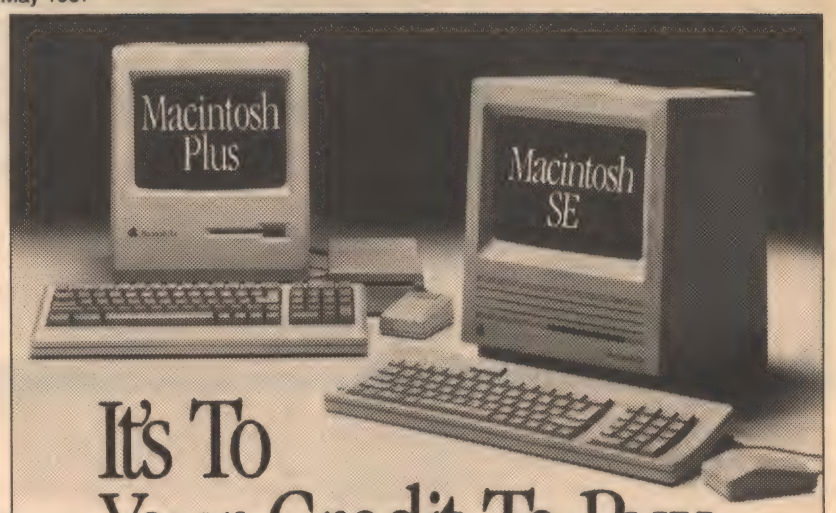

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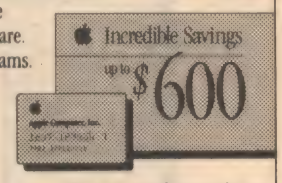

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BUSINESS PROFILE

How to keep business flying

PHOTO / DICK WILHELM

Bob Williams of Aero Controls, Inc.

Piloting parts and paper with a computer network.

by Andrew Himes

Bob Williams is a friendly, patient, soft-spoken man with a ready laugh—exactly the right personality for a guy who lives at the center of a crazy quilt web of tight, conflicting schedules, demanding customers, and an ever-lurking paperwork trauma that would make the last big New York City ticker-tape parade look like a Cub Scout newspaper drive.

Williams is a honcho in a hot seat at Aero Controls, Inc., an FAA-certified commercial aircraft repair station in Auburn, one of the newest of such stations in the country, and a company sure to end up on anyone's short list of the fastest growing companies in the Pacific Northwest.

His job is so diverse and demanding that even Williams has a hard time summarizing just what he *does* do.

"I kind of do everything," he said with a chuckle. "Buying, selling, hustling, facilitating jobs, keeping track of inventory; I guess I'm just a wheeler-dealer."

Williams keeps track of facts—an amazing multitude of data categories, a plethora of details—that until a few short years ago would have been far beyond the capacity of any one person to even begin to grasp, let alone successfully manage.

A few examples:

• A growing base of more than 400 different customers: companies such as Alaska Airlines, Southwest Airlines, America West, and most of the major airline parts brokers in the country.

• A small-parts inventory consisting of more than 10,000 line items.

• Between 30 and 40 "status calls" each day from anxious service customers who need to know about how a repair job is progressing through the shop.

• More than 400 repair jobs in the shop at any time, each of which must be accompanied by up to 15 different pieces of paper—job tickets, parts requisitions, FAA certification documents, purchase orders, vendor purchase orders, and so on and so on.

DATA BASICS

Company name: Aero Controls, Inc.
Ownership: John Titus, president.
Business: An FAA-certified aircraft repair station, mainly engaged in overhauling commercial-aircraft parts to the original manufacturer's specifications.
Incorporated: October, 1984.
Number of employees: 40, at one location.
Gross sales: $7 million/year.
Address: 1720 Pike St. N.W., Unit 2, Auburn, WA 98001. 206/735-3350.

Clearly, it's a challenge that, for unaided human beings, would be insurmountable. With the aid of computers, according to Williams, the data load becomes manageable.

It's not just a matter of handling the same work load with fewer people, said Williams. "We can do things with these computers now that would have been inconceivable before. The biggest thing is, a customer calls, and we know about what he's asking for, and we know it right now. We can call all the information we need up on the screen within 20 seconds, answer any questions, complete any deal we need to make, right away.

"Before, if a customer called about a job, we'd have to dig at him until we got his purchase order number, then we'd get the date the job got to us so we could figure out the job number, go to our job number file, check our own purchase order file, check with the warehouse or the shop, and then call the customer back later."

The difference computers have made is incalculable.

"We're dealing with a far larger customer base than before, but we don't have to hire a lot of people to run around and find things and correct screw-ups," said Williams. "We are processing much more information about jobs than we ever could before.

"People are mind-boggled by it. They actually enjoy dealing with us. They don't get put on hold, and they find out whatever they need to know right away, without waiting."

Williams said the computer system allows Aero Controls to be a more "customer-oriented"—and successful—company. The following scenario is typical:

A parts broker in Georgia calls, desperately in need of an actuator (an aircraft part). Williams checks his own parts inventory within seconds. He finds that he has no actuators available, but that one of his vendors does, so Williams buys the actuator and resells it to to the parts broker in Georgia—all within minutes, without ever getting off the phone. Voila! Aero Controls turns a quick and pain-free profit, and somebody in the Deep South is the happy owner of an actuator.

The heart of Aero Controls' computer system is an IBM PC-AT with a 60 megabyte (MB) hard (fixed) disk which acts as the file server.

Seven other PC compatible computers are linked to the AT via a Novell local area network (LAN); they include 6 Monarch PCs, each with dual 360K floppy drives, and one Genesis PC with a 20 MB hard disk system.

A 60 MB Everex streaming tape system provides data backup for the AT, and Aero Controls relies on two Okidata Microline printers (models 193 and 293) for hard copy (accounting tasks and correspondence).

The data base program is Microrim's *R:Base 5000*, a software package Williams called "versatile, wonderful, easy to use." Other software standards include two different word-processing programs—*Wordstar* and Microsoft *Word*—and *Crosstalk*, a Microstuf communications package.

The process of computerizing the company's operations began in September of 1985, less than a year after the new company filed incorporation papers. The first step was to buy the IBM PC-AT, along with one of the Okidata printers. The initial investment for the system was about $5,000.

"We never anticipated the growth we've had," said Williams. "We thought the AT would be enough for quite a while. At the beginning, we never dreamed we'd be doing our jobs 'in process.' We thought we'd get a call from a customer, go into the owner's office to use the computer, and then call the customer back in five minutes or so."

Within a short time, however, the limitations of the system became apparent. Business demands were growing, the customer base was expanding rapidly, and the company was getting an ever clearer idea of the advantages of computerized information-management systems.

In September, 1986, Aero Controls purchased the Monarch PCs and the network for an additional $17,000 investment, and shortly thereafter added the Genesis PC system for $2,000.

The major software investment was $4,000 for the *R:Base 5000* data base management system. "You can't beat using this system," said Williams. "*R:Base* has features that help you set up your own program; it just walks you right through all the steps you need.

"What we need here is nothing more than a high-tech shovel," Williams said. "The system needs to run itself. We want it to be really simple, so that the right data does get into the system from different points and without fail. We have to keep customers informed as to the progress of their job in our shop, and we need to know ourselves. We have to know about holdups on jobs, shipping delays, changes in schedules.

"It's not just three airlines and a couple brokers we're talking about," said Williams. "It's 100 customers who want to know about their job right now, and if we can't tell them about it, they feel we don't know what we're doing."

The friendly files

Whatever problems Aero Controls has had with its computer system stem directly from the headlong growth the young company has experienced. Ironically, those problems are a result of the *R:Base* system's user-friendliness and easy programmability.

"People write their own little commands on the system," said Williams, "and since we're all using the same subdirectory, when you've got a lot of people with their own little things it trashes up the data base. After a while, you've got unplanned and unstructured change. You decide that it will be a certain person's job to input a certain piece of data, and all of a sudden that person's job description is completely different."

Williams chalks it all up to the birth pangs of a new system, and expresses a solid optimism about both the *R:Base* software and the system as a whole.

"In the future," he said, "we'll have the different tasks standardized, and people will just plug into the system. Individuals will use their own subdirectories for special commands."

A variety of people within the company need to have access to the computer system for facets of their jobs. Owner John Titus, in addition to Williams, uses the system for buying and selling service and parts, and running the company. One employee in the purchasing department uses a terminal. A foreman in each of the three shops—components, transmission, and electronics—uses a terminal to enter the status of jobs passing through his or her department, to check on the status of parts, and to record problems.

In addition, the secretary uses it to send Telexes and form letters to advertising media and customers, a person in the receiving department uses it to assign new job numbers, and the person in charge of quality assurance uses it to clean up left-over data when a job goes out.

What does the future hold?

"We're already feeling the limitations of our present system," said Williams. "Our growth has been so phenomenal that we've already used up 45 Megs of memory on the 60 Meg hard drive system just since last fall. We can already see ourselves moving toward a mini-computer system sometime in the near future." **CU**

(Andrew Himes is a contributing editor.)

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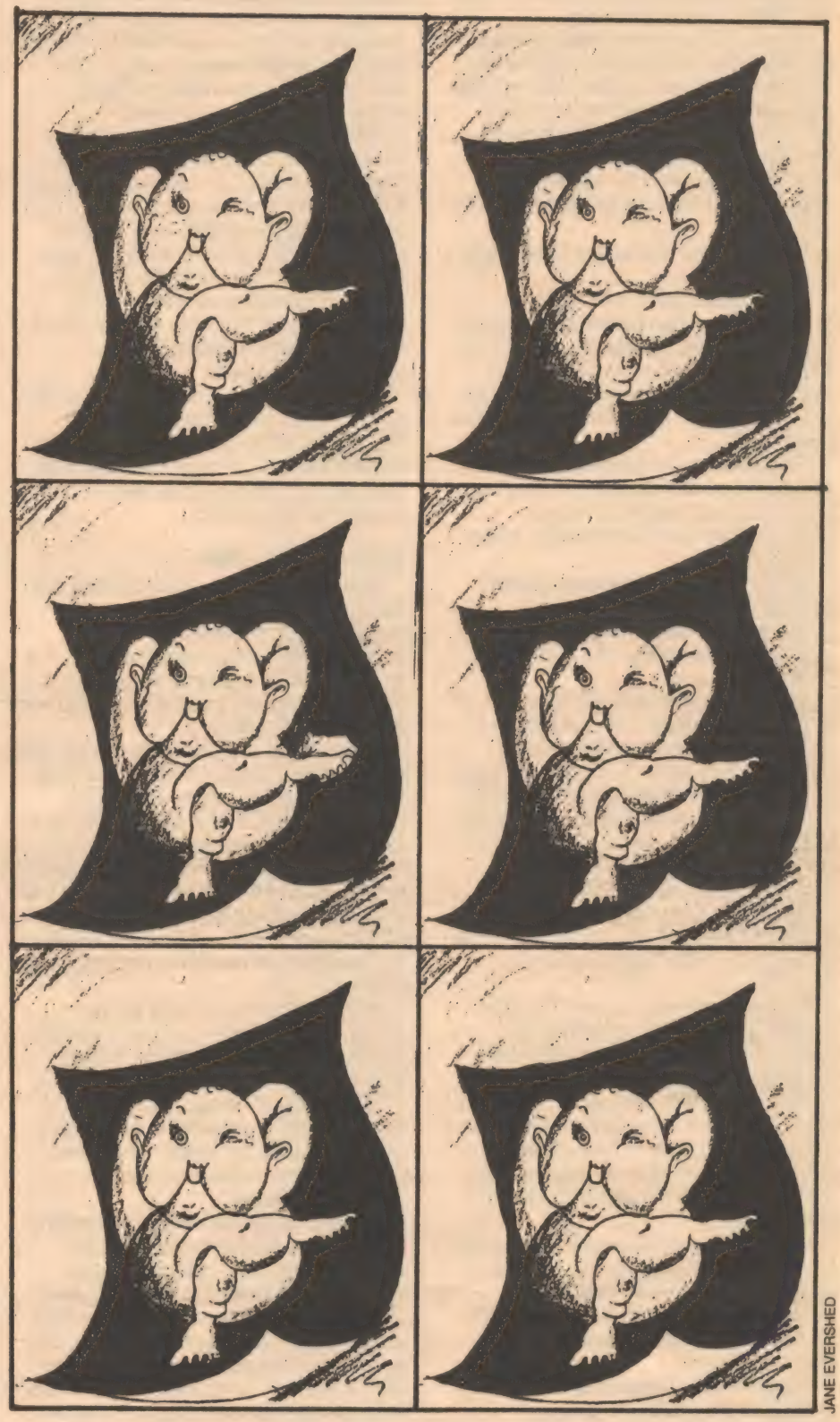


A few things about copying your mother didn't tell you.

by Chernah Coblentz

In ancient times there was the scribe. Caesar would say, "I want 5,000 copies of this proclamation on 60-pound gold parchment, for distribution throughout the Empire." Several years and scribes later, he'd get his copies, no doubt full of errors—any ergonomics expert can tell you what happens to accuracy in boring, repetitive tasks.

Now there's an easier way: copy machines. Not only are they a lot faster, producing anywhere from 6 to 50 copies per minute, but some of them even collate, staple, duplex (copy on both sides), reduce, enlarge, print in color and even allow you to edit.

The most popular plain-paper copiers operate by the xerographic process, in which light is reflected from your original onto a rotating metal drum. The drum surface retains a positive charge in areas that did not get exposed to light, so by no coincidence, these areas are exact mirror images of the dark portions of your original—namely, the type and graphics. The positively charged areas on the drum attract the negatively charged toner, a liquid or powdered darkening agent, from a rotating brush.

Next, the copy paper feeds between the drum and a series of wires that give the paper a stronger positive charge than the drum, causing the toner to be pulled off the drum surface onto the paper. Finally,

the paper passes through heated pressure rollers that fuse the toner to the paper.

As for the machines that copy in color, it's sometimes just a matter of switching toner cartridges so you overlay different color images on the same copy. Other machines approximate full-color printing by filtering out each primary color in turn from the original and automatically overlaying the appropriate toner colors on the copy.

What to consider

If you're in the market for a copier, what you need to look at are the tradeoffs between your copying needs, the price of the machine and the cost per copy. This term refers to the actual running expenses, including labor and consumables such as toner and parts (but not paper), divided by the number of copies you make, according to the special report on copiers in the June 1986 issue of *What to Buy for Business* a Rye, N.Y.-based publication.

The first way to narrow the field is to consider volume, or how many copies you expect to make per month. Personal or mini copiers, priced at under $1,000, make up to 500 copies per month before their relatively high per-copy cost starts to get the better of you. Their speed is about 8-10 copies per minute (cpm).

Low volume copiers produce 2,000-5,000 copies per month at a speed of 10-20 cpm, may offer reduction and enlargement and cost roughly $1,000-$4,000.

Medium-volume copiers make 10,000-50,000 copies per month at 20-40 cpm, often have document feeders and sorters and range in price from $3,000 to $15,000.

High-volume copiers, which can yield up to 100,000 copies per month at speeds of 60-100 cpm, often include features like automatic duplexing (meaning you don't have to turn the original upside down and feed it through again) and microprocessor-controlled job memory, and cost anywhere from $10,000 to over $100,000.

These classifications are offered as a roadmap, but they are arbitrary, and you'll find some overlap in features and prices. Just keep in mind your company's regular needs and be sure to consider all your options. If you only do occasional high-volume jobs, it might cost less in the long run to send them to an outside printer and get a low- or mid-volume copier for everyday use.

Copy quality is a major concern. An obvious statement, perhaps, but as Cecil Herline, executive vice president of Harris 3M Document Products of Atlanta, Ga., points out in the June 1986 issue of *The Office*, your goal is to get high-quality copies from all types of originals. Check to see that the machine copies edge-to-edge, with no bare spots or inked edges on the copies, and look for features that keep the toner from getting out of line. An automatic toner-control feature produces more consistent image quality. Toner cartridges are easier and less messy to change than is loose toner.

Extra features

There are a lot of features and bells and whistles out there, many quite impressive, but you pay a price for them. Do you really need to copy oversized documents onto oversized paper? If you work for a law or accounting firm, maybe you do. Or perhaps the more versatile reduction feature would do just as well. You'd have the same information, a little cramped but still readable, on 8½ by 11-inch paper, and you'd probably have a happier file clerk.

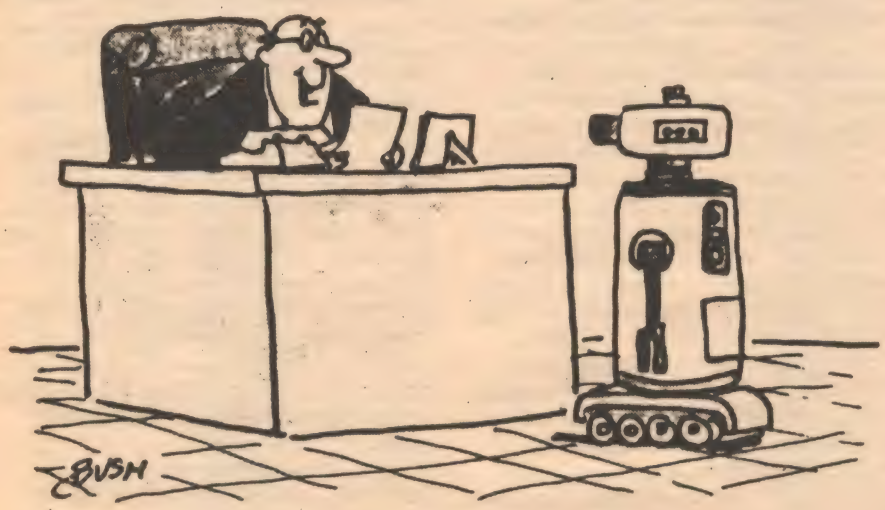
Ease of use is another important factor. Most vendors provide training, but a machine that's too complicated for the people you'd planned to have use it won't help their productivity. Speaking of training, it's a good idea to ask the suppliers what will be covered and who they'll train—all the users, or just the key operators (your designated in-house copier experts)?

What about prices? Some office managers and buyers report that a large number of manufacturers have jumped on the copier bandwagon, creating a lot of competition and weeding out some brands. The two sides of this coin are that it puts you in a strong position to negotiate for discounts and extra options, but you're well advised to be on the alert for the occasional slippery sales tactic—such as offering a discount on an inflated list price—that may surface in a highly competitive market. *What to Buy for Business* also notes that different brands may offer identical copiers at dissimilar prices. Shop and compare.

Finally, there is the service arrangement, which can range from paying for service as you need it at the going hourly rate to taking out a service contract for a specified number of copies or length of time. Whatever you end up with, be certain you know what it includes, so you don't get any surprises—like a bill for some parts you thought were covered.

CU

(Cherna Coblentz is a contributing editor.)



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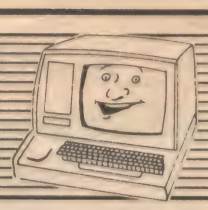

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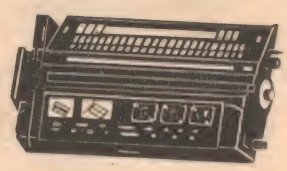

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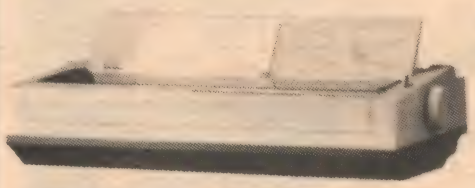

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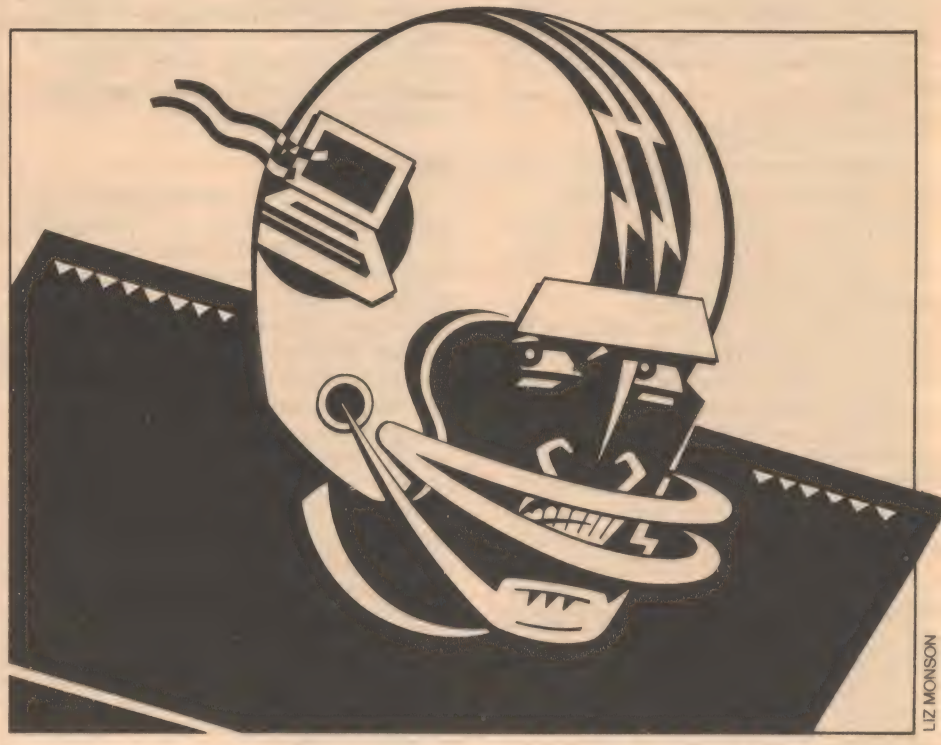

LIZ MONSON

Using computers to pursue the thrill of victory.

by Nora Leven

The fans went wild as their favorite team scored touchdown after touchdown. Beer flowed, toilets flushed and bets were collected. The spectators cheered and jeered, according to their individual loyalties.

Out of earshot, behind the sporadic uproar accompanying a fumble or field goal, was a soft, barely perceptible sound. It was the quiet clicking of keys and the gentle whirring of disk drives.

High above the pandemonium of a Super Bowl, game observers sit in the press box, silently and frenetically collecting statistics as they happen and tapping them into a portable computer. Who rushed how many yards. Who intercepted who and on what yard line. Punt returns. Kick-off returns. Tackles, fumbles and touchdowns. It all goes in, player by player, play by play.

Sitting near these game recorders are sports commentators, who, to the delight of the trivia-hungry public, read statistics on players' tendencies and biographical minutiae from inches-thick print-outs.

Contact sports have given new meaning to the phrase, "high tech, high touch," although computers were in use in professional sports long before John Naisbett of *Megatrends* fame coined that phrase. The earliest recollections are from 1963, when the Dallas Cowboys hired Salam Qureishi, an Indian programmer, to devise a computer program to process and rank the thousands of college recruits the team had been scouting. (An Indian coming to the aid of the Cowboys added a certain irony to the arrangement, one that did not go unnoticed by the local press.)

For ten years running, the program seemed to give Dallas a competitive edge in signing on new talent. But other teams soon followed suit and the Cowboys' program was allowed to go stale. It now lies fallow from lack of updating. It may or may not be due to cause and effect, but the Cowboys experienced their first losing season last year after more than 20 years of wins. Once again, the Cowboys turned to Qureishi.

Qureishi is now president of Sysorex International, a large mainframe and computer-consulting company in the heart of California's Silicon Valley. David Kohler, director of research and development for Sysorex, is working with the Dallas Cowboys to devise a new program for scouting. The competition is so stiff that Kohler declined to divulge even the hardware on which the new program will run, for fear of giving away a crucial ingredient to what he and the Cowboys hope will propel them into the lead once again.

He did, however, agree to explain just how the computer can assist in selecting the most promising recruits to bash heads with the likes of professional football players. Using a rating scale of 1 to 9, recruits are graded on a number of physical, performance and character attributes according to the position they play. Ability to cut right or cut left, running speed and arm strength are just a few of the performance criteria. Competitiveness, quickness and coachability also are important qualities, although a little more difficult to quantify than height, weight and running speed. Still, the scouts know what they're looking for, and if they rate a recruit a 6 on competitivenss, they know just exactly how competitive that college athlete really is.

While some of the reports are made from films of the players, most are observed in person. The scout interviews the player, watches him work out and talks to his coach. Hundreds of players are followed, and each may be reported on anywhere from five to fifteen times, so there are literally millions of pieces of data to process. All this information, some in the form of essays and anecdotes, is assigned numerical weightings, fed into a formula, analyzed and ranked.

But even before all this, there is a battery of statistical analyses that must be completed before the new recruits are ranked. "You've got to do a lot of statistical analysis beforehand," Kohler said. "You correlate to see how well certain factors work, and how well you did in the past in predicting the performance of known players. Then you've got to use the results of that analysis in an ongoing real-time system."

While Kohler insists that it is ultimately human judgment that has the final call in draft selection, the computer is indispensible as a tool to aid that judgment. "There's no way a human being can look at tens of thousands of essays and decide whether player A is better than player B," he said. "You have to have some sort of numerical system as a basis for comparison. That's not to say the Cowboys just slavishly follow the recommendations of the computer. It's just used as a starting point of a very lengthy discussion about a player."

More than a machine

While players in football, baseball, hockey and basketball all are accustomed to being reduced to statistics and fed into computers, the machine's encroachment on the area of human judgment is still a very touchy issue. Some coaches swear by the computer's ability to simulate plays or analyze the opposition's moves, but others remain skeptical.

The Dallas Cowboys make a steady habit of analyzing an upcoming opponent's three previous games, Kohler said. By NFL rules, the two contending teams must supply each other with film from those three games. Each film is physically split into two parts, one showing the defensive plays and the other the offensive plays. Each formation is recorded on computer and the plays are analyzed. The squads then know which plays are likely to be called in certain formations and can train accordingly.

Baseball's longer season gives managers more chances to correct problems in their rosters, but baseball players don't escape computer-aided evaluations of their abilities.

Tom Kelly, manager of the Minnesota Twins, receives printouts on how every one of his hitters performs against every pitcher in the league, and how every one of his pitchers does against other teams' hitters. He looks at each player's game averages and lifetime statistics, but he's quick to point out that looking doesn't mean believing. "I look at it, but if I feel a player is doing well, I won't put a pitcher on the bench," he said. "If he's in a good streak for himself, I'm not going to yank him out of there because the computer said don't pick this guy. I go by what I see on the ballfield. I don't let the computer influence me. If it says this guy is a 50, but he plays like an 80 or 90, well, maybe the computer isn't right."

Computerization of the Twins' scouting department is just in its infancy. The long-range plan is to compile a file on every player in professional baseball, including his personal biographical information, career statistics and all scouting reports. "We wind up spending a lot of time looking through six or eight resources for all the information we need," said Bill Smith, assistant director of minor leagues and scouting. "The advantage of the computer is it can put all this information in one place that's easily accessed."

Networking

Most professional sports leagues carry on league-wide scouting, transferring reports through electronic mail to those teams equipped with computers. In addition, the individual teams usually conduct their own scouting maneuvers, merging proprietary information with the league's reports. Leagues are trying to establish networks with their individual member clubs, which means instituting system specifications and recommendations. The National Football League and National Basketball Association, for instance, have declared DEC their official computer. The National Hockey League asks its teams to use IBM.

In all sports, the leagues tend to use their network systems mostly for information dissemination. They may contract with sports-reporting bureaus to process player, team and game statistics, but the delivery of those reports to individual teams is handled by the system's electronic mail. The team reception has been good, according to Jay Wasack, senior consultant for the NFL in New York City. "Our job was to give [the teams] a painless operation. The usage of the system is much higher than we had expected. It started out as an electronic-message device, but over the past year we've put more business requirements onto it." Other uses include maintaining contract information and all the office-automation applications any business might use.

At the NBA, the league system is used to analyze team gate receipts, game scheduling and legal correspondance and to maintain a data base on players and opponent teams. The 23 NBA teams are encouraged to use DEC equipment, but there is no mandate to do so. Right now, the goal is to strengthen the league office's computer operation, and perhaps down the road work on tying the teams together in a network.

For the most part, professional sports leagues respect the autonomy of the individual clubs. Any one team is free to expand on the applications provided by the league if it so desires, or to apply the technology to suit its own unique needs. One computer application growing in popularity among selected teams is sports medicine. The leagues know certain teams are using computers in diagnosis, treatment and training, but so far no one league has offered any specific guidelines in this area.

Paul Steingard is director of the Center for Sports Medicine and Orthopedics in Phoenix and is the team doctor for the Phoenix Suns basketball team. He also treats players on several high-school and college teams in Arizona. Through the National Athletic Information Reporting System (NAIRS), sponsored by the National Collegiate Athletic Association at Penn State University, he can study the relationships between specific sports injuries and certain training procedures and playing habits.

For example, he has learned that most football helmets perform about the same in terms of injury rates. He also has learned through NAIRS that catastrophic injuries can occur if a player trains with his neck in a certain position that straightens the spine. Knowing this, coaches no longer use that particular excercise in training.

Computers built inside excercise machines also come in handy for measuring heart rates and other vital signs during workouts. Physiological data from these machines is analyzed by computers to determine how the patient compares with others of comparable age, weight, height and playing position. Other machines measure the strength of the muscles around the joints and assist the doctor in prescribing strengthening therapy. Nutritionists use the computer for devising diets suitable to the player's body type and sport. (Basketball players need to be svelte; football players need bulk.)

For all the possible applications currently used or proposed, the computer's ultimate function in sports boils down to a cheerleader of sorts. It is flexible and seemingly untiring, but it never actually touches the ball, bat or puck. It is there on the sidelines to help the team win and to keep the media and fans satisfied and entertained (with statistics).

It isn't essential to have a computer to play a game. It's just convenient and fast and helps provide a point of reference to the coaches and drafters. Remarked one sports-bureau president: "You can play a game without computers and statistics, as long as you keep score." CU

(Nora Leven is a contributing editor.)

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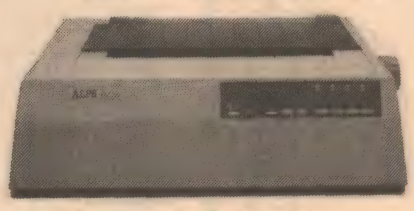
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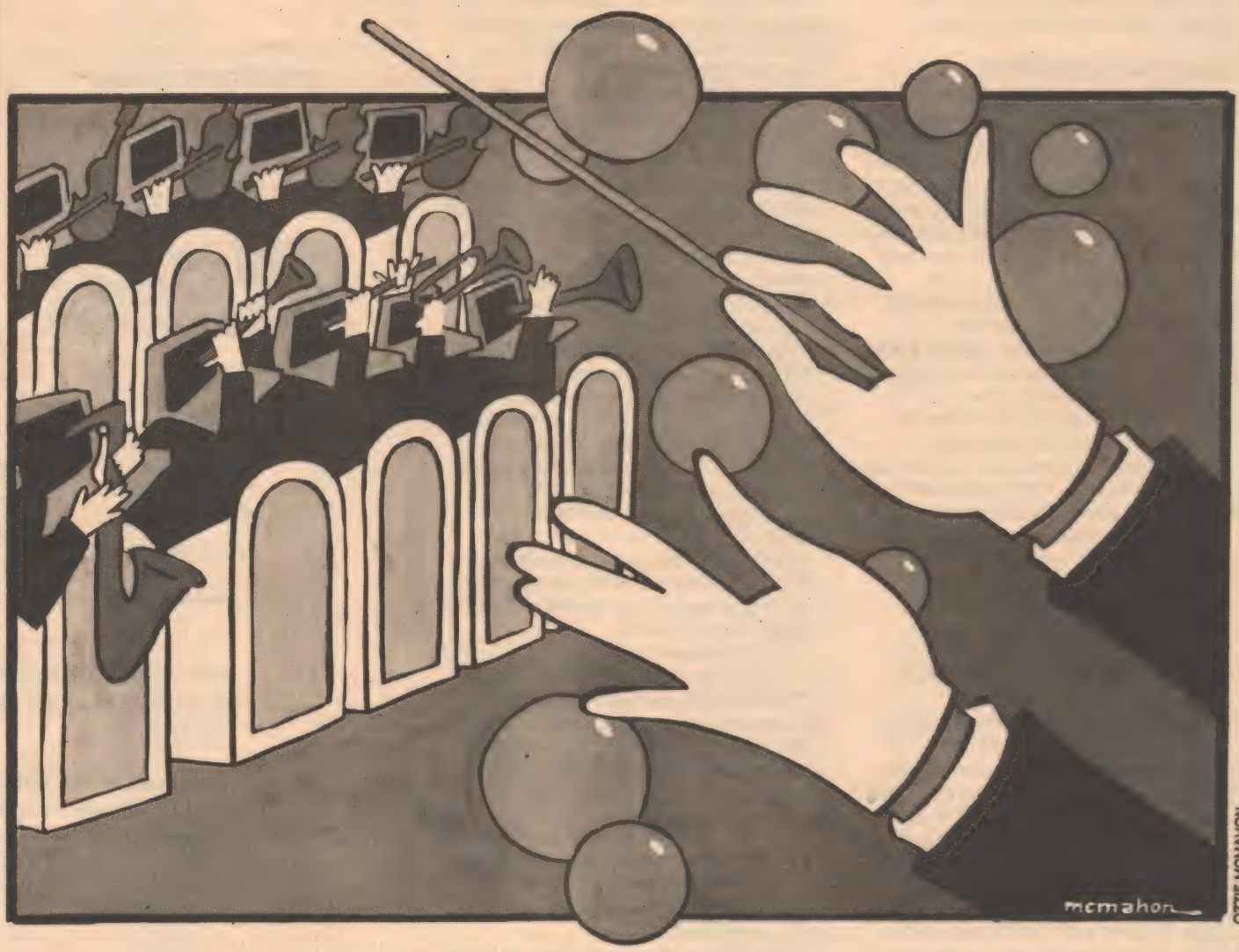

OZZIE MCMAHON

An' a-one an' a-zero an' a-one....

by Si Dunn

The chips are alive with the sound of music.

Virtually any microcomputer in use today can thrust you into the artistic spotlight as a composer and performer of music, even if you can't read notes or play a conventional musical instrument.

Songs can be composed and played with nothing more elaborate than the Sound command found in many versions of BASIC (Beginner's All-purpose Symbolic Instruction Code). And the compositions can be saved to disk or cassette tape—your very own albums!

On the other hand, with the right hardware and software, your home computer can take you straight into the vast, powerful world of MIDI, the Musical Instrument Digital Interface.

Via MIDI, your machine can become the heart of a small jazz combo, a full symphony orchestra, a thundering rock band or a quiet flute duet—with all sounds created electronically. Not only can you create, conduct and perform music with a microcomputer, but you also can build a home recording studio or a professional studio around your machine.

Many microcomputer owners already are enjoying homemade music, whether it's elementary tunes performed with BASIC or a full-blown digital composition built from hundreds of synthesized instruments.

More than a third of today's home computer users list music as a secondary interest, according to one market survey. Meanwhile, some 25 million Americans are amateur keyboard players. Sales of MIDI-compatible electronic keyboard synthesizers, such as those made by Casio and Yamaha, are booming. Even the cheapest of these synthesizers allow you to create a wide range of instrumental sounds, from piano to guitar and organ and numerous variations, just by pressing the keys.

Not surprisingly, many companies great and small have jumped into the market fray, and offer wide arrays of computer products aimed at professional and serious amateur musicians, as well as casual hobbyists.

MIDI in, MIDI out

Much of the computer world remains in discord over standards in areas such as graphics displays. But the computerized-music field is very much in harmony these days—and growing—thanks to the MIDI standard.

The Musical Instrument Digital Interface first came into play in 1982. The big names in electronic music, such as Yamaha, Korg, Roland, CBS-Rhodes, Casio and E-mu, agreed that there should be hardware and software standards governing digital communications among electronic musical instruments.

Today, you can select from a huge collection of MIDI-compatible keyboard synthesizers, drum machines, bass machines, guitars and other instruments and accessories.

Although there are a few variations within the MIDI standard, it basically works like this: Information is transferred serially from one electronic instrument (or microcomputer) to another instrument at 31,250 baud (roughly 3,000 characters per second) through a standardized five-pin plug.

You need only a microcomputer, a MIDI interface, a stereo amplifier, a synthesizer keyboard, a tape recorder and some software to become a one-person band, composer, conductor and studio.

This information is in the form of mathematical statements that approximate waveforms—the basis of all sounds—and variations that determine tone, timbre, the length of the sound, timing and other various technical information. A MIDI device known as a sequencer records these mathematical statements and can help you make subtle editing changes not possible with conventional tape-recording methods. A sequencer modifies portions of single notes, blends various synthesized sounds together and allows them to be output to a synthesizer.

You can't use MIDI directly to record vocals or acoustical instruments—it's strictly digital. (MIDI-compatible digital voice processors *are* available, if you have the bucks.) If you are a singer or instrumentalist, though, you can use a

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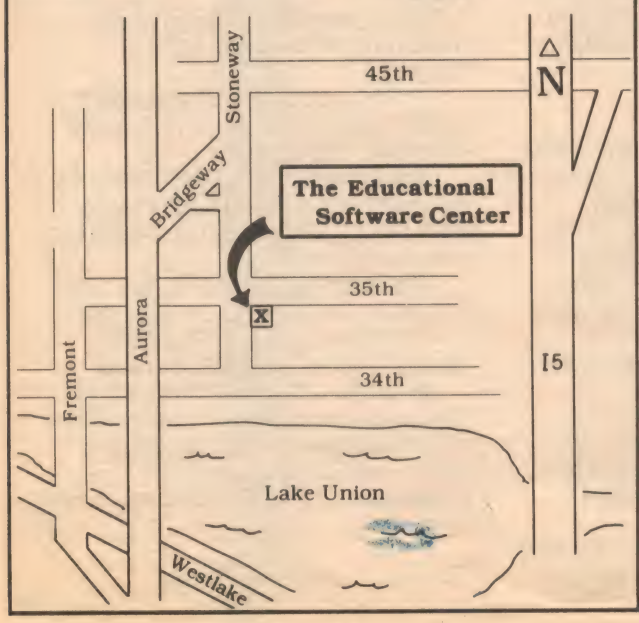

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microcomputer-based music system to practice your songs or difficult passages over and over and never wear out the electronic musicians that accompany you.

If you'd rather hear trumpets than guitars on a track you have just created, you simply hit a few keys to change the sound from strings to brass. Want to change the song from an upbeat rocker to a ballad? No problem. The computer sends out the clock pulse or beat that synchronizes all the instruments.

For budding or veteran musicians on tight budgets, MIDI-interfaced microcomputers and synthesizers are an artistic godsend. You can create complete demo tapes at home, without hiring other musicians or paying $175 an hour to rent a recording studio.

BASIC Bach

Of course, if you'd rather just tinker and not get fancy, you can spend no money and stick with BASIC. Many microcomputer instruction manuals and books on BASIC programming contain information on composing, playing and saving songs.

Some computers (the IBM PC, assorted clones, the Apple II series and Radio Shack's Color Computer II) have only one built-in voice. Fans of the Commodore 64 and 128 can program up to three voices, as can owners of the IBM PCjr and the Tandy 1000. Serious musicians, though, prefer the advanced sound features in such machines as Apple's Macintosh, Commodore's Amiga, and Atari's ST series.

The Mac, for example, has a quartet of electronic voices and the ability to drive external stereo speakers; in addition, add-ons such as the MacNifty (Kette Group, Minneapolis, Minn.) audio digitizer package allows the plotting of sound files into a recognizable Mac screen through hardware and software; if volumes of software determines the validity of a machine, then the Macintosh (at the moment) is the clear leader in the field, with such titles as *ConcertWare* and *Professional Composer* available. The titles range in sophistication from the professional composer to the home user who wants to teach musical rudimentaries to children.

The Atari 520 and 1040 ST machines are designed for musical compositions: They include a musical synthesizer chip and MIDI ports for direct connections to other synthesizers.

The Commodore Amiga, meanwhile, is a home musician's dream machine. It has a custom-sound chip, a built-in sound and voice synthesizer, four programmable music channels, 16 electronic voices, and a big, nine-octave sound range. Programs that combine music and animation are already available for the Amiga.

If you prefer a dedicated music box, trek down to a music store and check out Yamaha's CX5M Music Computer. The CX5M and its peripherals can do it all, from tone generation to printing out sheet music. You also can do word processing, telecommunicate your compositions to other computers, and link the CX5M via MIDI to other synthesizers.

Upgrading to MIDI

If you decide to upgrade your non-MIDI microcomputer to the world of synthesized music, you must seek out the right hardware and software for your machine.

The August 1986 issue of *Family Computing* contains a comprehensive guide to getting started. Two other good sources of information are a pair of monthly music magazines, *Keyboard* and *Electronic Musician*.

Computer stores that carry musical products or music stores that also sell computers are good starting points for MIDI information and MIDI-oriented products and demonstrations.

With some machines, such as the Atari, you will need only some music software and a synthesizer keyboard to plug into the MIDI port. To use MIDI with other microcomputers, you must have a keyboard synthesizer, a MIDI interface (these can be bought as plug-in cards or cartridges or outrigger boxes, depending on your machine), music software, a stereo amplifier or tape recorder and appropriate cables.

In some applications, additional sound-generation boards also may be required, such as the Mockingboard for the Apple II, IBM PC and compatibles.

If the software allows you to generate sheet music, you'll also need a printer with appropriate graphics capabilities.

MIDI recording and editing

One MIDI recording-and-editing product now creating a stir is the Promidi SDA-200 Studio System developed by a Texas company, System Design Associates. Unlike many other products designed to adapt microcomputers to music, Promidi goes beyond random-access memory (RAM) and writes notes directly to disk in real time. The length of compositions and the number of recording tracks, meanwhile, is limited only by the disk space of your machine.

Thus, musical inspiration is not wiped out by a sudden power failure. The memory barriers common in standard MIDI sequencers are bypassed. An extended solo can be kept going for several hours and many thousands of notes, instead of just for a few dozen or few hundred notes.

"A three- to four-minute pop tune typically has 3,000 to 4,000 notes," said Larry Mitchell, marketing director for System Design Associates. Promidi, he pointed out, can write up to 60,000 notes on a single 5¼-inch floppy disk or more than 1.5 million notes on a 10-megabyte hard disk. "Someone can sit down and jam for hours, and not run out of disk space."

Promidi, which costs $599, requires an IBM PC or compatible, 256K RAM and a monitor, plus one or more MIDI-compatible instruments, such as keyboard synthesizer, drum synthesizer or MIDI guitar.

Promidi blends sequencer and telecommunications technology and is billed as a MIDI recording and editing tool. It was created for professional musicians and recording studios, but an increasing number of computer hobbyists also are buying it, said Mitchell.

The product features numerous help screens and a well-organized menu that allows beginners to start navigating their way around the system quickly.

Making MIDI music is not cheap, with prices for MIDI-compatible synthesizers alone running at $300 and more. At the same time, more and more musical voices are being packed into synthesizers, and MIDI-compatible products are gaining powers and capabilities undreamed of just one or two decades ago.

Coda

To get more information on musical micros and MIDI, write or call the following:

- The International MIDI Association, 11857 Hartbrook St., North Hollywood, CA 91607. 818/505-8964.
- The American MIDI Users Group 24-hour computer bulletin board, 214/276-8902 (300, 1200 or 2400 baud; eight bits, one stop bit, no parity).
- *Keyboard Magazine*, P.O. Box 2210, Cupertino, CA 95015 ($19.95 per year).
- *Electronic Musician*, 2608 9th St., Berkeley, CA 94710. ($22 per year).
- In addition, the June 1986 issue of *Byte* magazine contained several articles on computers and music, including a pieces on MIDI interfaces, MIDI programming in Turbo Pascal and musical synthesis. **CU**

(Si Dunn is a free-lance writer.)

RLL hard-disk controller cards

New technology offers big benefits to PC users.

by Dan Aldrich

Perhaps you've seen the ads proclaiming "Half a Drive Free." Perhaps you've heard or seen the term "RLL" and have wondered what it means.

For those of you who are curious, RLL stands for "run length limited" and it is a new encoding/data compression technique for hard disks. RLL is an important new technology that offers big benefits to those who are about to add a hard-disk drive to a personal computer. To make a long story short, RLL is simply a new encoding technique that is 50 percent more efficient than the standard encoding technique used on most currently available hard-disk controller cards for PCs. This increase in efficiency means that disk drives with a capacity of 20 megabytes (MB) with a standard disk controller have a 30MB (50 percent greater) capacity with an RLL controller. Similarly, disk drives with a 100MB capacity using a standard disk controller have a capacity of 150MB with an RLL hard-disk controller.

If you're wondering how much this new technology costs, you'll be pleased to learn that prices for an RLL disk-controller card and hard-disk drive range from the same cost as a standard drive-and-controller pair up to a maximum of 20 percent more. In most cases, such an RLL pair offers 10-100MB of additional storage capacity at virtually the same cost as a standard hard disk and controller. As an added bonus, RLL speeds up disk performance by approximately 5 percent.

PC compatibility is not an issue with RLL. Its encoding is transparent to end users. RLL has been tested and works with all IBM PC compatibles, including AT&T, Compaq, ITT, Tandy, Leading Edge, Zenith, Sperry, NCR, Hewlett-Packard, Sanyo, Commodore and Epson as well as other lesser-known compatibles.

Sound too good to be true? There is one limitation that potential buyers should be aware of. Not all hard-disk drives are compatible with RLL disk controllers. An RLL disk controller requires a drive that has a high-density coating on the hard disk and also requires slightly wider bandwidth from the read-write electronics on the hard-disk drive.

So, you may ask, how does one know if a drive will work with an RLL disk controller? There are three ways to find out:

- Manufacturers of disk drives normally will list both a standard (MFM) storage capacity and an RLL storage capacity on the data sheet for drives that are designed to operate with the RLL disk controllers.
- Manufacturers of RLL disk-controller cards usually publish a list of drives compatible with RLL controllers.
- Suppliers of RLL disk controllers and hard-disk drives can provide you with the information you need. Simply tell them how many megabytes of storage you are looking for and ask which RLL disk controller and compatible disk drive they recommend.

Popular 20MB (MFM)/30MB (RLL) drives include the Seagate ST-238, Miniscribe 3438, MicroScience HH-330, Rodime RO-202E and Lapine LT-300. Drives in several other sizes from several other manufacturers are also available.

Concerning reliability, RLL encoding is a proven technique. Reliability of RLL drives and controllers is very good and is no different than reliability figures for standard drives and controllers. In the early 1970s, IBM began using the technique on mainframe disk drives and has been using it without problems ever since. However, Adaptec was the first firm to modify this technology and apply it to PCs.

Adaptec is a Milpitas, Calif., manufacturer that specializes in hard-disk controller cards. It shipped its first PC-Bus RLL disk-controller cards during the latter part of 1985. In addition to Adaptec, Western Digital and OMTI have recently introduced RLL disk-controller cards. Adaptec currently offers four RLL disk controller cards—the ACB-2070 (full length) and the ACB-2071 (short slot) disk controller for the PC XT, the ACB-2370 (hard disk only) for the PC AT and the ACB-2372 (combination hard and floppy disk) controller card for the PC AT. Adaptec, OMTI and Western Digital products are available nationwide from Pioneer, Hamilton-AvNet, Mycrotek and Proto PC.

According to industry analyst James Stone of Shearson-Lehman, within 12 months 50 percent of all PC manufacturers, including IBM, will be using RLL. Other industry analysts predict the shift to RLL disk controllers will happen sooner and that the use of RLL will be much higher.

According to industry analyst James Stone of Shearson-Lehman, within 12 months 50 percent of all PC manufacturers, including IBM, will be using RLL. Other industry analysts predict the shift to RLL disk controllers will happen sooner and that use of RLL will be much higher.

All things considered, RLL has a lot to offer to business PC users. RLL technology is reliable and inexpensive, offers a 50 percent increase in hard-disk capacity and a 5 percent speed increase on disk operations and is available today from local distributors and retailers. **CU**

(Dan Aldrich is a computer consultant.)

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The ultimate in computer security

How the government stops electronic eavesdroppers.

by Raymond J. Schneider

The roof of the Soviet embassy in Washington, D.C., bristles with antennas of all description. There, in the heart of the capital, Russian intelligence records all manner of potentially sensitive information. Little escapes the scrutiny of electronic eavesdroppers who monitor everything from your cellular-telephone conversations to the microwave towers that provide many of the circuits for long-distance telephone traffic and industrial communications. Privacy is an illusion.

Using just a few hundred dollars worth of electronic equipment not unlike that used to listen to satellite dishes, skilled individuals can invade the privacy of their neighbors. Perhaps more surprising is that, not only can they listen in on communications such as telephone and television signals, but they can even display what the businessman at the corner bank is doing on his personal computer. Most Americans are uninformed about their vulnerability to electronic snooping.

The military is most sensitive to this problem. In order to protect military information, signals are often encoded through a process called encryption. The encrypted signal is sent to the party with whom you want to communicate and they decode or decrypt the message using their knowledge of the code. The security provided by a code is measured by how long it would take to break it. Using the technology available today it is possible to create codes that even the most powerful computers cannot break. (Ed. note—According to James Bamford, author of *The Puzzle Palace*, much of Seymour Cray's early research on supercomputers was on behalf of the U.S. National Security Ageny for code-breaking purposes.) However, if the plain text of a message can be obtained together with the encrypted version, then the process of breaking the code is greatly simplified.

The military has had to worry about this problem for a long time, and out of this concern grew the government's Tempest program. Tempest was a code name for a program of testing electronic equipment intended for secure communications, making sure that it did not emit radiation that would allow an enemy to detect the nonencrypted version of a message and be able to put it together with the encrypted version. Today the term is used more generally to refer to equipment that conforms to all applicable Tempest requirements specified in the national Tempest standard, NACSEM 5100 *Compromising Emanations Laboratory Test Standard, Electromagnetic (U)*, dated March 1974, or the current version, NACSIM 5100A, dated July 1981.

Among the sources of information on equipment that meets the national Tempest standard is the U.S. government's *Preferred Products List* (PPL), published quarterly by the Government Printing Office for the Pentagon. The growth in the use of PCs, and the volume of sensitive information now being originated, manipulated, processed and communicated via PC has made what was once an obscure bit of defense trivia a timely issue of importance.

The kinds of secure information that can be compromised by using a non-Tempest PC include classified documents being prepared on a PC, passwords or secure account numbers (used when a PC is a terminal into data bases or other digital-communications applications like the transmission of financial information). All kinds of sensitive information are becoming more accessible to electronic eavesdroppers as sophisticated digital-processing equipment moves out of the centralized computer center and into the automated office environment.

In order to make the government's *PPL*, the accredited equipment must pass a battery of difficult tests. Among the kinds of signals that must be suppressed by shielding or other means are those that create the herringbone pattern on your television set when a poorly shielded personal computer is running. Many early PCs failed to meet Federal Communications Commission (FCC) standards for inhome use. The result was that the proud PC owner often was jamming a neighbor's television reception without even knowing it. Tempest restrictions on emissions are even more stringent than those of the FCC, which is only concerned with interference, while the Pentagon is concerned with vulnerability.

Tempest certification of personal computer-related equipment is something of a growth industry. As awareness grows of the ease with which the data being processed by such equipment can be compromised, those in industries with real security concerns are taking the same kind of prudent precautions taken by the Pentagon. The methods used to safeguard a piece of equipment involve eliminating energy emissions for the device that might be detected and interpreted by an eavesdropper. These emissions are generally either acoustic or electromagnetic. These signals are reduced by filtering and shielding the devices, using many techniques. One can also introduce confusing noise (acoustic or electromagnetic) to make the detection of the information more difficult.

To understand the vulnerability of a signal in simple terms, consider a daisywheel printer. The mechanism strikes a petal of the daisy when the appropriate character is under the hammer. An eavesdropper who gets a clear recording of the printer can infer which character was struck by analyzing the patterns of the sound, since the time the hammer strikes the petal will identify the character struck. Using recorded signals and an understanding of the principles of operation of a device often allows such interception of the information.

The *Preferred Products List*, mentioned earlier, is published under the auspices of the Countermeasures Advisory Panel (CAP), composed of representatives from the Pentagon as well as civil departments and agencies of the government. The *PPL* consists of four sections:

- White Section I, which contains a listing of newly Tempest-certified products that have not yet undergone the required production test.
- White Section II, which contains a complete listing of certified products.
- Yellow Section III, which contains a complete listing of products removed from Section II due to newly discovered and confirmed security deficiencies.
- Red Section IV, which contains products that have been removed from the *PPL* because of unresolved deficiencies and are deemed unacceptable for continued approval.

With relatively few exceptions such testing is done either by firms in the Washington, D.C. area or in southern California. Tempest testing is an expensive process, but it can be essential to doing business with the military. A breakthrough in Tempest use cited by Jerry Cashin in a January article on Tempest products published in *Government Computer News* was an Air Force-Navy procurement in 1985 of 30,000 Tempest personal computers. This contract, worth over $100 million, was won by Zenith Data Systems. The same article estimates the overall size of the current Tempest market at upwards of $750 million annually.

Tempest is not a panacea. To be effective it must be combined with a complete security program that includes a careful audit of what information should be protected and at what level. Stowage of sensitive information when it is not being worked on is an important component of a security system and perhaps most important of all is employment and training of a security-conscious staff.

Another way to achieve electronic security is through the use of shielded rooms. The tradeoff between putting conventional equipment in a shielded room and purchasing safegurarded equipment is an economic decision. Tempest-approved equipment generally costs on the order of twice what the same equipment costs without Tempest protection. Large mainframes are difficult to protect and generally must be operated in shielded rooms to be secure. Costs for shielded enclosures can easily run into the hundreds of thousands of dollars, depending on the degree of shielding and the size of the area. The shielding materials are electrical conductors like copper sheets. Particular concern has to be exercised to shield doorways and any other penetrations into the area. Once the enclosure has been installed, it should be inspected and tested regularly to ensure that it retains its shielding properties. Such factors as corrosion can greatly reduce shielding effectiveness, especially at doorways and access panels.

A substantial investment in safe equipment or shielded rooms can be ineffective if it is not remembered that security is not merely a matter of equipment but also, and more fundamentally, a matter of people. Tempest-certified equipment will not protect either the government or industry from espionage practiced by trusted insiders. Small optical diskettes that can fit easily in a person's briefcase, pocket or purse are capable of holding as much as a billion bytes of information—that's over a quarter million single-spaced typewritten pages. Thus not only must security-conscious organizations have equipment that is secure, but even more importantly, they must be assured of the integrity and trustworthiness of the individuals they employ who have access to sensitive information. **CU**

(Raymond J. Schneider is a Washington, D.C.-area free-lance writer.)

MICROSPHERE

CALENDAR

Puget Sound Computer User welcomes information about regional, computer-related meetings, seminars, trade shows, and similar events. Regularly scheduled classes will not be listed, however. Due to editorial and production delays, announcements should be mailed no later than three weeks prior to the date of publication for the issue in which you would like your announcement to appear. For example, an announcement for a June seminar should be mailed to us no later than May 7th.

We reserve the right to edit announcements. Send information to: Calendar Editor, *Puget Sound Computer User*, 2724 N.E. 45th St. #385, Seattle, WA 98105.

Tacoma's Modern Office Expo, co-sponsored by *Puget Sound Computer User*, will be held May 13 & 14 at the Tacoma Dome/Convention Hall. Hours are 10 a.m. to 6 p.m. both days. (See ad on page 19.)

Atari Trek '87, an all-Atari computer exposition presented by Puget Sound Atari Users Groups in cooperation with Atari Corp. will be held May 16 & 17 from 10 a.m. to 6 p.m. at the Flag Plaza Pavillion at Seattle Center. For more information, write Atari Trek '87, Box 97, 2442 Market St., Seattle, WA 98107. (See ad on page 32.)

The Heath Zenith Computers & Electronics store (505 8th Ave. N., Seattle) offers **free desktop publishing seminars** twice weekly in the afternoon. The seminars alternate between the Apple Macintosh SE and the Zenith 80286 MS-DOS computers. The seminars provide an overview of publishing systems, hardware and software requirements, and local publishing services. Aldus *PageMaker* and Microsoft *Word 3.0* are used for the demonstrations. *Ready-Set-Go 3.0* and Quark *Xpress* are among the other page-composition software packages available for examination. Attendance is limited to six. Call 206/682-2172 for a reservation.

A course entitled **Computer Graphics in Medicine and Surgery** will be held on June 26 at the Virginia Mason Medical Center in Seattle. The course will begin with a brief summary of important topics in computer graphics as related to medicine and follow with specific applications in various research and clinical fields. For more information, contact Linda Orgel, Director of Continuing Medical Education, Virginia Mason Medical Center, 1100 9th Ave., Seattle, WA 98111.

USER GROUPS

If you haven't yet purchased a computer or want to make the most of the one(s) you own, why not visit a user group? User groups consist of people who have banded together to help each other and exchange information.

Group members generally own a particular brand of computer or have a special interest in a specific application. Most user groups welcome new members and you needn't have any special knowledge or experience to join, just a common interest in some aspect of computing.

Members range from novices to advanced programmers and they are all eager to learn and teach. So if you need advice or just want to meet some fellow computer users, there's no better way than to visit a user group. What follows is an alphabetical list of local groups broken into two broad categories: machine-specific groups and special-interest groups (SIGs). Be aware that meeting times and locations may change without notice, so a phone call to the appropriate person may prove to be a wise investment.

If we have neglected to list your user group or you wish to make changes to an existing listing, please call us at 206/323-4300 or, better yet, write User Group Editor, *Puget Sound Computer User*, 2724 N.E. 45th St. #385, Seattle, WA 98105. Please provide the name of the group; meeting time, date and location; and a contact person, phone or address.

Machines

Adam

Adam users meet three times a month at Eastside, Central and South (Tacoma) locations. A monthly newsletter is available for $5/yr. Send SASE for a sample to: Puget Sound Adam Network, 22607 S.E. 322nd, Kent, WA 98042. For meeting information, call 938-5276 (eves.) or 886-1167. The Adam Network now has a floor within the Brigadoon BBS (206/723-5631, 8 p.m.-8 a.m.). For access, identify yourself as an Adam user.

Alpha Micro

The Alpha Micro Users Society, Puget Sound Chapter, (PS/AMUS) meets on the 2nd Thurs. of the month at 7 p.m. at Specialty Woods Manufacturing, 2614 Pacific Hwy. E., Fife. For details, contact Brion Norton at 546-5572.

Apple

The Apple Pugetsound Program Library Exchange (A.P.P.L.E.) Coop meets on the 3rd Tues. of each month at 7:30 p.m. at 290 S.W. 43rd St. in Renton. The emphasis of this large group is on the Apple II and Macintosh families of computers. For information, contact Shirley Reinhardt at 251-5222.

The Macintosh Downtown Business Users Group (DBUG) generally meets at 6:30 p.m. on the 2nd Tues. of the month at varying locations. For details, call Tim Celeski at 932-4466.

MACDUB, the University of Washington Macintosh users group meets monthly on campus. This group is for University students, staff and faculty. For information, contact Fred Nick at 543-8110.

Mac Zoo, the North Seattle Macintosh Users Group, meets the 4th Wed. of the month at 7:30 p.m. at 7211 Greenwood Ave. N. (Laserworks). Contact Kathleen at 789-6544.

The Northwest Apple Pickers (NWAP) meet at the Lakewood Public Library, Gravely Lake Dr. and Wildaire Rd. near the Villa Plaza Shopping Center in Tacoma. For information, call 459-7598 or 584-6524.

The South Puget Sound Macintosh Users Group meets at 601 McPhee St., West Olympia, on the 3rd Thurs. of the month at 6:30 p.m. Contact Wil Tanijo at 491-4446 for details.

Atari

The Starbase Atari Users Group meets on the 2nd Fri. of the month at 7 p.m. at the Mountlake Terrace Library. For information, contact Doug Olson at 337-1421.

The Kitsap County Atari Computer Enthusiasts (KC-ACE's) meet at 7 p.m. on the 2nd Wed. of the month at Central Kitsap Jr. High School in Silverdale. Contact Roy Smith at 377-2523 for information, or write KC-ACE, P.O. Box 2333, Bremerton, WA 98310. BBS number is 479-2157.

The Bellevue/Redmond Atari Computer Enthusiasts (BRACE) is an officially recognized Atari users group that supports both the 8-bit and 16-bit machines. Meetings are held on the 2nd and 4th Mondays at 7 p.m. at the Lake Hills Library, 15228 Lake Hills Blvd. in Bellevue. Offers public-domain software and cooperative newsletter. For more information, contact Gary Skelton at 454-7488.

The Seattle/Puget Sound Atari Computer Enthusiasts (SPACE) meet at 6 p.m. on the 1st Sat. of the month at the Highline Community College. For information, contact David Showalter at 824-5141.

A sub-group of SPACE meets at the Computers Plus Store, 10310 S. Tacoma Way, Suite K at 9 a.m. on the 4th Sat. of the month.

Commodore

A.M.I.G.A., the A.P.P.L.E. Members Interest Group for the Amiga meets on the 2nd Wed. of the month at 7:30 p.m. at 290 S.W. 43rd in Renton. For information, call Ken Hoffman at 251-6787.

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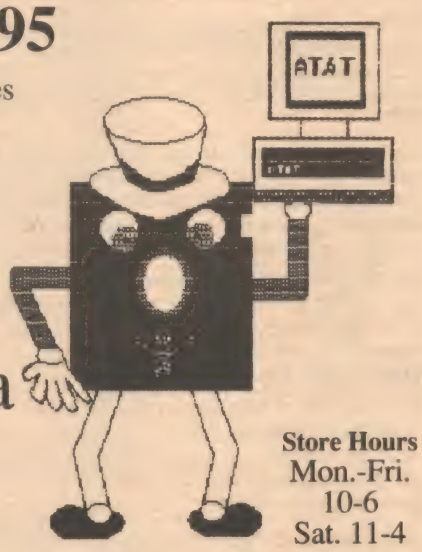

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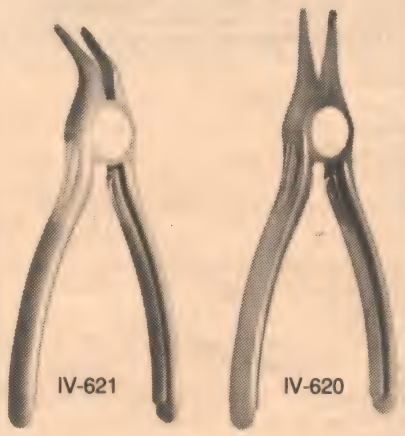

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The Amiga Users Society Eastside (AMUSE) meets at 4:30 p.m. on the 3rd Sat. of each month at the Lake Hills Co. Library, 15228 Lake Hills Blvd., in Bellevue. Contact Steve Reed for details at 883-4193.

The Kitsap Amiga Operator's Society (K.A.U.S.) meets at 6:30 p.m. on the 2nd Tues. of the month at Fairview Jr. High near the intersection of Fairgrounds and Central Valley Rd., Bremerton. Anyone interested is welcome. For information, contact Guntis Murins at 396-2857 days, or 698-2196 eves.

The North Seattle Amiga Users Group meets on the 1st Wed. of the month at 7:30 p.m. at 17050 2nd Ave. N.W. near Shoreline Community College. For information, call Jim Naiden at 546-3482.

The N.W. Commodore Users Group meets at 7:30 p.m. on the 3rd Tues. of the month at the Lake City Community Center, 12531 28th Ave. N.E. (Mainly C-64 and C-128 owners.) For information, contact Dick Ball at 284-9417.

For information on the Olympia Commodore Users Group, call Bob Orman at 456-4679.

The Olympic Peninsula Users Group (O.P.U.G.) meets twice each month, the second Wed. of each month in Agnew and the 4th Thurs. in Port Angeles. For information, call 452-9939 or 452-3242.

The Renton Computer Group meets on the 3rd Tues. of the month at 7:30 p.m. at the Fairwood Library in Renton. The group consists mainly of Commodore users but is open to anyone. For information, contact Sam Grubbs at 271-9436.

The South King County Commodore Users meet at 7:30 p.m. on the 3rd Wed. of the month at Denny's in Auburn, 521 S. Auburn Way (off Highway 18). For information, contact Lee Hauser at 838-8484 (eves.).

The University of Washington Commodore Users Group meets at 7:30 p.m. in the UW Academic Computing Center classroom on the 3rd Thurs. of each month. For information, call Dave Little at 481-2135.

The University of Washington Amiga Computing Group meets at 7:30 p.m. in the UW Academic Computer Center classroom on the 3rd Wed. of the month. For more information, call John Willott at 775-9195.

WAG, the Washington Amiga Group, meets the 2nd Sat. and 4th Thurs. of each month at the Aerospace Machinists Union, 2121 W. Casino Rd., Everett. For information, contact Richard Medved at 743-9576.

The 64 E/T Commodore Users Group meets monthly at Family Savings, 16202 Bothell-Everett Hwy., Mill Creek, WA 98012. Contact Don Winder at 776-0747 for information.

Cordata/Corona

Cordata/Corona users who are interested in starting a users group are invited to call George Kuchenbecker at 542-8427, or write him at 802 N.W. 193rd, Seattle, WA 98177.

Digital Equipment (DEC)

The Gold Key Club, for users of DECmates and Rainbows, distributes a newsletter, answers questions, and holds occasional meetings in downtown Seattle. Call Steve Anderson at 467-4444 for information.

DECUS SEALUG meets on May 13th at 7:00 p.m. (open at 6:30) at the Puget Power Auditorium (same time). Ivan Orton will speak on computer security. Contact Steve Lorentzen for information at 282-7319.

The DEC Bellevue Users Group meets the 3rd Thurs. of the month at 7:15 p.m. Offers newsletter, advice and big Rainbow public-domain software library. Contact Hugo Kruiniger at 641-2052 for information.

Eagle

The Eagle Users Group meets at 7 p.m. on the 3rd Tues. of the month, but this may vary by quarter. The group's interests are non-technical and relate to Eagle 8-bit computers and/or *Spellbinder* word-processing software. For information, contact Lee McCullough at 226-3640 or Goldie Silverman at 524-5309.

Epson

The Epson Salts group meets in the 5th floor conference room of the Swedish Medical Center at 7:30 p.m. on the 2nd Thursday of the month. Interest centers around the QX-10 and related Epson machines. For information, contact Bill Batson at 775-5110 (W) or 364-9451 (H).

The Kent Epsonics (Epson QX-10 users), meet at 7 p.m. on the 4th Tues. of the month at Kent Library. For information, contact Joe Salz at 941-7408.

Heath/Zenith

The Pacific Northwest Heath/Zenith Users Group meets on the 2nd Thurs. of the month at 7 p.m. at the downtown Seattle Heathkit store. For information, contact Barry Dupler at 643-6651.

Hewlett-Packard

The Club of Hewlett-Packard Hand-held Users, also known as the Personal Programmable Calculator Group, holds meetings on the 2nd Wed. of the month at 7:30 p.m. in the upstairs classroom of the Academic Computer Center on the University of Washington campus. For information, call Bob Moore at 543-7879 or 364-9636.

The Hewlett-Packard 150 Users Group meets at 7 p.m. on the 1st Thurs. of the month at the Hewlett-Packard offices at 15815 S.E. 37th in Bellevue. Vectra and Portable users are also included. For information, contact Pete Ross at 342-8875 (days).

IBM

The Pacific Northwest IBM PC Users Group meets on the 2nd Tues. of the month at 7:30 p.m. at the Museum of History and Industry. Beginner's Corner starts at 6:45 p.m. For information, contact Larry Shaw at 641-7040.

The Tacoma Area PC Users Group meets at 9 a.m. on the 1st Sat. of the month at the South End Neighborhood Center, 7802 S. "L" St. in Tacoma. SIG meetings are held on successive Mondays at 7:30 p.m. at 2811 Bridgeport Way W., Suite 24 in Tacoma for spreadsheet, data base, communication, and investment program support. Periodic SIG meetings designed to support new users are scheduled on demand. Contact Lew Chichester at 565-4917 (days).

The Puget Sound PCjr Users Group meets the 3rd Mon. on the month at 7 p.m., normally at the Lynnwood P.U.D. Building at 21018 Highway 99. However, time and location is subject to change. For information, call Norm Shatz at 745-9685 or write P.O. Box 6551, Lynnwood, WA 98036.

The Lower Columbia IBM Users Group meets monthly. For information, contact Fred Mattfield, P.O. Box 978, Long Beach, WA 98631.

The Mercer Island IBM PC/MS-DOS Users Group notes the following monthly topics: May - Sr. program manager Greg Lobdell and the newest Microsoft language releases. June - Manfred Schmeidl of Microrim and special comments on Clout, R:base V and graphics. For information, contact Jim Hood, 206/236-0470; P.O. Box 1506, Mercer Island, WA 98040. Newsletter on disk, shareware public-domain library,beginning through advanced users. Machines covered include IBM, Leading Edge, Magnum, Tandy, and compatibles.

Individuals interested in joining an IBM PCjr group that would meet in the Olympia area please contact Bob Schley, 3030 Cloverfield Dr., Olympia, WA 98501. 357-4718.

Kaypro

The Kaypro Campus Users Group meets the 3rd Thurs. of the month at 7:30 p.m. The group offers a public-domain CP/M software library, help with *WordStar, PerfectWriter, dBase*, telecommunications, ZCPR3, and other CP/M applications. Call David Miles, chairman, at 543-6848 or 329-9063 for meeting locations and sample newsletter.

The Puget Sound Kaypro Users Group (PUGSKUG) meets the 2nd Tues. of the month from 7 p.m. to 9 p.m. at Tukwila Community Center, S. 131st St., just off the West Marginal Way freeway in Tukwila. For information, call Rod Hafemeister at 475-4024 (Tacoma) or John Lustig at 525-6257 (Seattle).

The Sno-King Kaypro Users Group meets on the 2nd Tues. of the month at 7:30 p.m. at the Edmonds Unitarian Church, 8109 224th S.W. in Edmonds. Call Jim McClaugherty, Pres., at 776-3533 or write to P.O. Box 2522, Lynnwood, WA 98036.

The Tacoma Kaypro Users Group (TACKUG) meets the 1st Mon. of the month from 7-9 p.m. at Lincoln Lanes (upstairs), 3828 S. Yakima Ave. in Tacoma. Call Rod Hafemeister at 475-4024 for information.

The Whidbey Island Kaypro Users meet on the 2nd and 4th Wed. at 7 p.m. at Computer Services, 1397 Midway Blvd., Oak Harbor.

Miscellaneous

The Olympia Komputer User Group, formerly the Olympia Kaypro Users Group, meets in Olympia when announced. The group is for CP/M and MS-DOS users, as well as Morrow users. For information, call Fran Flerchinger at 357-9119 in Olympia.

Morrow

Meetings of the Seattle Morrow Users Group are tentatively scheduled for the 2nd Thurs. of the month. For information call Marilyn Holt at 782-1443.

NEC

The Puget Sound NEC Users Group meets on the 2nd Mon. of the month at 7:30 p.m. at Corporate Computer, Inc., 1530 Eastlake Ave. E., Suite 101, Seattle. For information contact Walter Taucher at 328-4463.

The Sea-NEC Users Group meets on the 1st Wed. of the month at 7 p.m. For details, call John Meister at 883-3686.

North Star Computer Society

Meetings are held the 3rd Wed. of every month at 7:30 p.m. in conference room 5 north at Swedish Hospital. Contact George E. Hughes at 935-7440 for information.

Osborne (CP/M)

The Seattle Osborne Users Group (SOUG)/Osborne Executive Users Group (OEUG) meets jointly at 7:30 p.m. on the 1st Tues. of the month at the Alaska N.W. Fisheries Bldg., 2725 Montlake Blvd. E., (enter from Hamlin St.). Call 232-2763 or 323-4153 for information.

The Tacoma Osborne Group (TOG) meets at 7 p.m. on the 1st Mon. of the month at Parkland Library, 404 Garfield St. S. in Tacoma (near Pacific Lutheran University). Meetings are free and open to the public. TOG has a monthly newsletter, is an AMO of FOG and has the complete FOG disk library available. Membership is not limited to Osborne users. For information, call Bob Thomson at 752-5582

The South King County Osborne Group (SKOG) meets at 7:30 p.m. on the 3rd Wed. of the month in the Gold Room, Bldg. 4 at Highline Community College, Midway, (near Midway Drive-in on Hwy. 99 S.). Meetings are free and open. SKOG has a monthly newsletter, is an AMO of FOG and has the complete FOG disk library. Membership is not limited to Osborne users. For information, call Carl Tenning at 824-3843.

OSI

The King County OSI Users Group meets at 7:30 p.m. on the 4th Thurs. of the month at 25607 West Valley Highway in Kent. For information, contact Walt Studer at 852-5123 or Bon Bernard at 782-1165.

Sanyo

The North End Sanyo Users Group meets on the 2nd Wed. of the month at 7:30 p.m. at the Bothell Public Library. For information, call Bob Fulmer at 762-7837 (SMARTER), Joe Rogers at 547-TYPE, or John McCoy at 324-7402.

Tandy

The CoCo/68XXX Microcomputer Users Group (MUG), which deals mainly with the Radio Shack Color Computer, meets on the 1st Tues. of the month at 919 Grady Way in Renton (Boeing). For information, contact Ron Schuman at 625-2705.

Texas Instruments

The Puget Sound Texas Instruments PC Users Group meets on the 2nd Thurs. of each month from 6:30-9 p.m. at the UW Academic Computing Center, Pacific & Brooklyn. For information, contact Lloyd Quatier at 776-6018.

The Kitsap 99ers meet every 2nd Sat. at 7 p.m. in the Science Bldg. on the Olympic College campus (next to N.E. parking lot). For information, contact Dennis at 479-4523 or Roy at 479-2619, or write: Kitsap 99ers, 774 NE Pinecrest Dr., Bremerton, WA 98310.

The Puget Sound 99er's usually meet at 7 p.m. on the 3rd Thurs. of the month. For information, contact Chuck Wynne at 745-3249.

The Tacoma 99er's Users Group meets at 8 p.m. on the 1st and 3rd Thurs. of the month at the South End Pool Multi-purpose room at 402 E. 56th St. in Tacoma. For information, call 474-7310.

TIC TAC (a TI 99 group) meets on the 2nd Tues. of the month at 7 p.m. at the Lake City Community Center, 12531 28th Ave. N.E. For details, write Rita Glickman, 10025 N.E. 120th St. D3, Kirkland, WA 98034.

The TI99/4A Computer Users (of Olympia) meet on the 3rd Thurs. of the month from 2 p.m. to 4 p.m. in the South Sound Shopping Mall community room (between Sears and the Rainier Bank machine). Take the Lacey exit from I-5 southbound or the Sleater Kinney exit going north. Call Fern & Bob at 491-1518 for information.

The Sea-Tac TI Orphans (TI 99/4a) meet every last Wed. of each month at the Valley Ridge Library on S. 178th and Military Rd. above the S.W. corner of Southcenter at 7 p.m. For information contact Al Howe at 833-9244.

Timex

The Seattle Area Timex Users Group (SEATUG) holds two different meetings each month. The main meeting is generally held on the 1st Wed. of the month from 7-9:30 p.m. in Room J112, Health Sciences Bldg., on the University of Washington campus. For information, call John Scearce at 251-2460 (days) or 784-8327 (eves.), or write P.O. Box 88361, Seattle, WA 98188-0361. A smaller group interested in the 2068 Timex color computer meets on the 1st Sat. of the month at the Kirkland Public Library from 10 a.m. to 12:30 p.m. For information, contact Jim Balazic at 881-5864.

"Now, are you sure that was a syntax error?"

Victor

The Victor 9000 Users Group generally meets from 7-9:00 p.m. on the 3rd Thurs. of the month at varying locations. Call David Ortman at 633-1661 for information.

Wyse

Those interested in starting a Wyse users group are invited to call Rick Swenson at 682-4068 (days) or Don Shepherdson at 284-8039 (eves.), or write Wyse Users Group, c/o Rick Swenson, 85 S. Atlantic St., Suite 205, Seattle, WA 98134.

Zenith

See Heath/Zenith listing above.

Special Interest Groups (SIGs)

American Society for Training & Development (Puget Sound Chapter)

Holds occasional meetings of its Computer Training SIG for professional trainers. For information, call 623-8632, Bill Fly at 524-6700, or Stephen Lundgren at 442-7968.

APL

The APL Special Interest Group meets at 5 p.m. on the last Mon. of the month in Room 149, Savery Hall on the UW campus. Call Fido Net 138, Node 24 at 525-1357 (a computer bulletin board) for information.

Architects, Engineers and Planners

The Architects, Engineers and Planners Users Group meets on the 3rd Tues. of the month at 5:30 p.m. at the AIA Seattle Chapter Office, 1911 1st Ave. This group is an organization for the informal exchange of information in the design professions. Call Allen Anthony at 329-3045, or 329-1572 for information.

Association for Women in Computing (Puget Sound Chapter)

Meets the 2nd Mon. of the month except Dec., July, and Aug. Social hour begins at 6 p.m., dinner at 7 and speaker at 8. Occasional pre-meeting technical seminars at 5:30 p.m. For information, contact Linda Frase at 865-5764.

AutoCAD

The *AutoCAD* Users Group of Seattle meets at 7 p.m. on the 3rd Tues. of every month at Griffin College, 10833 N.E. 8th, Bellevue. For information, contact Dan Flanagan at 771-5334 or Keith Shockley at 881-6935.

Boeing

The Boeing Employees Computing Society meets at 7:30 p.m. on the 1st and 3rd Mondays of the month at the Boeing Recreation Center, 22649 83rd Ave. S.E. in Kent. For information write Lois Willis at P.O. Box 3707, Seattle, WA 98124 (Mail Stop 8H-35).

Blind/Visually Impaired

The Pacific Northwest Blind and Low-vision Users Group meets at 6 p.m. on the 1st Wed. of the month at the Washington Library for the Blind and Physically Handicapped, 821 Lenora, Seattle. Use side door. Meetings cover computer applications for the visually impaired and employment possibilities. For information, contact James S. McIntosh at 282-8797.

C

The Seattle C Users Group meets on the 3rd Tues. of the month at 126 - 3rd S. in Edmonds. Dave Moore is host. Call 776-3600 for information.

dBase

The Seattle *dBase* Users Group meets at 6:30 p.m. on the 1st Thurs. of the month at the CX Corporation, 2620 Rainier Ave. S., Seattle. A complimentary newsletter is available. For information, call Rex Erickson at 632-9095.

DPMA

The Evergreen Chapter of the Data Processing Management Association meets on the 3rd Thurs. of the month at the Landmark Motor Inn, 4300 200th St. S.W. in Lynnwood. Contact John Benzic at 365-4500.

The Puget Sound Chapter of the Data Processing Managers Association meets at 6:30 p.m on the 2nd Thurs. of the month at Triples, 1200 Westlake Ave. N. (dinner meeting). For information, call 587-DPMA.

The Mt. Rainier Chapter of the Data Processing Management Association serves Pierce, Thurston, and Kitsap Counties. The chapter meets on the 3rd Thurs. of the month at the Executive Inn in Fife (5700 Pacific Highway East). For information, call Scott DeWall at 587-4433.

Educators

The Apple Pugetsound Program Library Exchange (A.P.P.L.E.) Coop has a Special Interest Group for educators which meets on the 4th Tues. of the month at 7 p.m. at 290 S.W. 43rd in Renton. For more information, contact Mona Meighan at 763-1657.

Enable

The Puget Sound *Enable* Users Group has been meeting at 7 p.m. on the 4th Mon. of the month in Bellevue. (Enable is an integrated software package.) For details on future meeting times and locations, contact Harry Chesler at 885-5231.

Genealogy

The Seattle Genealogical Society Computer Interest Group meets on the 2nd Sat. of the month from 10:30 a.m. to 12:30 p.m. at the Jones Bldg. at 3rd and Union. Check at the Genealogical Society office on the 2nd floor for the exact room. For information, call Ida S. McCormick at 784-7988.

Laptop computers

A laptop users group meets at 7 p.m. on the 2nd Wed. of the month at the Tandy Computer Center in Crossroads Mall, Bellevue. All laptop owners are invited. For more information, contact Carl Von Papp at 641-1265 or Steve Moller at 486-5830.

Legal

The PC Legal Users Group meets on the 2nd Tues. of each month at noon in the main conference room of Short & Cressman, 3000 First Interstate Center, 999 3rd Ave., Seattle. Bring your lunch. For information call Steve Wacker at 223-7387.

Lotus

The Pacific Northwest Lotus Users Group meets at 7:30 p.m. on the 3rd Wed. of the month at the Unigard Insurance Bldg. C, 15805 N.E. 24th St. in Redmond. For information, contact Will Stitt at 624-1113.

Multimate

The Multimate users group meets on a semi-regular basis at Edmonds Community College. The group leader is Carol Dreger. Call Edmonds Community College for information (206/771-1621).

Nursing

A special interest group for nurses meets in the Tacoma area every 2 or 3 months at varying times and places. Contact June Olberding at 206/475-9281 or write Box 98766, Tacoma, WA 98498-0766.

Pascal

The Pascal Users Group meets on the 4th Wed. of the month at 7:30 p.m. at the Washington Natural Gas Building. For information, contact Jim Adkins at 633-3182 or Allen Hulse at 622-6767, ext. 377.

PC-DOS/MS-DOS

The PC-DOS special interest group meets at 7 p.m. on the 4th Thurs. of the month at a location to be determined. The group is devoted to discussion of DOS 2.X and above commands, batch file development and *The Norton Utilities*. For information, contact Dick Sleight at 932-0476.

The PC/MS-DOS Beginner's Special Interest Group meets from 6-8 p.m. on the 3rd Tues. of the month. For information on time and location, contact Anna at 881-6492 (eves.).

MUG (MS-DOS Users Group) of Olympia meets on the 3rd Thurs. of each month at 7:30 p.m. in the W.A.C.O. (Washington Association of County Officials) Building, 206 E. 10th in downtown Olympia. The group covers IBM and other MS-DOS machines. For information, contact Brian Geppert at 459-3576.

PICK

For information regarding the PICK Users Group contact Judy Terreberry at 443-2365.

Public Domain Software

The Public Domain Software Library Users Group meets the last Thurs. of the month at 7:30 p.m. at the UW Academic Computing Center (2nd floor classroom), 3737 Brooklyn Ave. N.E. The group meets to distribute the SIG/M (CP/M), PCBlue (IBM), and PCSig (IBM) libraries at no charge. Contact Dick Joslin at P.O. Box 68374, Seattle, WA 98188.

Revelation

The Northwest *Revelation* Users Group meets at 7 p.m. on the 1st Wed. of the month at the Sunshine Baking Co., 14625 N.E. 20th,

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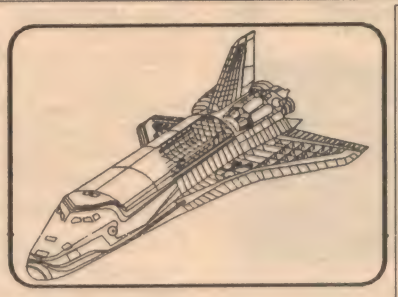

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Robotics

The Seattle Robotics Society meets at 7 p.m. on the last Thurs. of the month at United Products, 1123 Valley St., Seattle. For information on this diverse group, call Phil Clyde at 682-5025.

SMART

The Seattle Area Smart Users Group meets every 3rd Tues. at the Wilburton Center, 12241 Main St. in Bellevue. For more information, call Jennifer Meltzer at 445-5978 or write P.O. Box 3044, Bellevue, WA 98009.

Social Responsibility

Computer Professionals for Social Responsibility (CPSR) is an organization whose members are concerned about society's use of computer technology. The Seattle chapter meets on the 3rd Tues. of the month at different locations. Call Doug Schuler at 783-0145 (eves.) for additional information and/or meeting locations.

Telecommunications

Telecommunications Users Group (TUG) meetings are usually on the 3rd Sat. of the month. For information, call Vince Lowe at 587-6280 or log on the TUG BBS 763-3116 (data only) or write TUG, P.O. Box 45254, Seattle, WA 98145.

UCCEL

The UCCEL Northwest Regional Users Group (UNRUG) meets three times a year in Seattle, Portland, and at UCCEL's national conference. Dues are $20 a year per company. Contact Ron Kerrigan at Blue Cross, 15700 Dayton Ave. N., Mail Stop 408, Seattle, WA 98111.

Unix

The Seattle Unix Group meets on the 4th Tues. of the month from 7-8:30 p.m. at Bannan Auditorium, Seattle University. For information, call Bill Campbell at 232-4164. Call publisher's bulletin board at 322-8655.

Ventura Publisher

The Seattle Ventura users group meets on the 3rd Mon. of the month at Seattle Central Community College, Room 110, at 7 p.m. Contact Chad Canty at 328-4144 for more information.

WordPerfect

The *WordPerfect* Users Group holds a general meeting on the final Tues. of each month from 7-9 p.m. at the Radio Shack Computer Center, 18405 Aurora Ave. N., Seattle. For details, contact Bob Routt, P.O. Box 42, Redmond, WA 98052, or call 868-2932.

BBS NUMBERS

A Bulletin Board System (BBS) is a personal computer that has been programmed to answer the telephone and allow automatic communication with other computers over the phone line.

Most BBSs are owned, operated and financed by hobbyists. Others are owned by businesses or user groups. Boards are used for exchanging messages, trading software, as electronic publishing instruments or just for experimenting.

If you have no experience with telecommunications (communication between computers over the phone lines), using a BBS is a good way to learn. It is unlikely you'll do any harm if you make mistakes and nearly all boards are free-access. It could open up a whole new world for you.

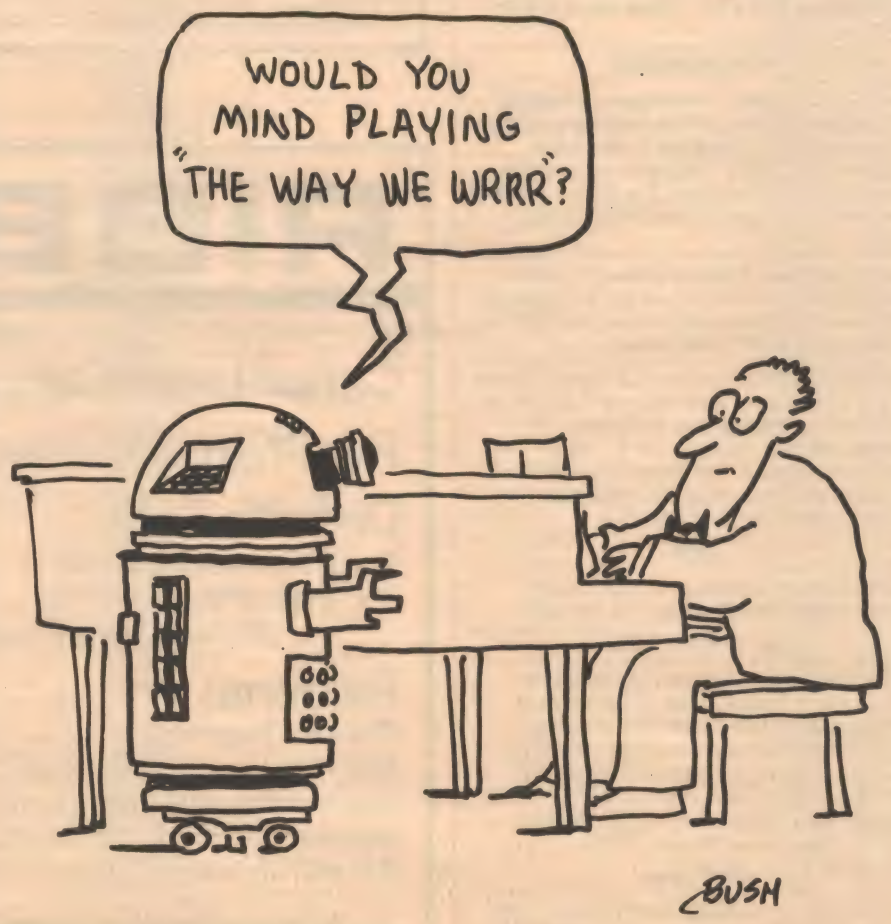
Puget Sound Computer User publishes this list as a public service. If your board is listed against your wishes, please contact us and we will delete it.

This list was compiled by Grim Reaper, system operator of the Stonehenge: UnderWorld BBS. Changes to this list should be requested by logging on to the Underworld board. Note: All boards listed below operate 24 hours a day unless otherwise indicated.

Local (Area Code 206) BBS Numbers as of Apr. 19, 1987:

BAUD RATE KEY:
a=300 baud
b=300/1200 baud
c=300/1200/2400 baud

Name.....Number, Baud rate
A-Link..... 774-4735, c
Access Northwest.....573-7006, b
Action Annex .....892-8969, b
Adam's RiBBS .....882-3684, c
Alki >128< Express ..... 937-5800, a
Alpha Centauri .....581-3779, a
Ancient Mariner .....839-6177, a, 8pm-6am
A.P.P.L.E. Crate (The Crate NW.1)872-6789, b
A.P.P.L.E. Crate (The Crate NW.1)251-0543, b
Apple Crate II525-5410, a, 8pm-8am; 24wknds
Arrakis .....542-4628, a
A.R.B.B.454-3781, a, 3pm-9pm/10am-10pm wknds
A.R.S. .....767-3223, a, 6pm-9am
Assassin's Circle..839-2380, a, 11pm-6:30am
Asylum.....824-3652, a
Atlantian-Lemurian Confederation 634-1539, a
Back Fence..... 772-1710, b
Bandits Hideaway..... 883-6306, a, 8pm-3pm
Barbary Coast..... 353-6966, b
Beavers Board ..... 778-1147, a, 9pm-6am
Becklan Empire ..... 886-7179, b
Bellevue ROS .....641-4521, b
Bermuda Triangle .....771-8420, b
Board of Education .....524-6953, b
Brigadoon.....723-5631a, 10pm-8am
Budget Board ..... 271-8613, a
Camp Crystal Lake ..... 271-2211, b
CBBS/BECS ..... 235-9496, b
Cellar][.....232-8144, a
Centaur Isle.....735-4425, b
Chameleon Circuit966-4855, b, 10pm-7:30am
Citadel: Babel..... 363-8969, c
Citadel: Bauhaus ..... 672-0956, b
Citadel: Cafe Dionysos & Co.....523-8874, a
Citadel: Dark Tower .....241-8886, b
Citadel: Greenlake Connection .. 782-6669, b
Citadel: Phantasie Land..... 874-2545, b
Citadel: Skyline .....628-3811, b
Citadel: Spectrum.....355-4340, b
Citadel: Tapestry ..... 784-9014, b
Citadel: World of Krynn ..... 228-9416, b
City of Atlantis .....486-8872, b
Com-Soft .....337-2144, a
Com-Soft (Alternate #).....742-8422, a
Commodore Alley ..... 859-0525, a, 9pm-7am
Commodore User Group (CUG)..743-6021, c
Commodore User Group E.end & S.end364-6497, c
Computech Information Service .759-4391, a
Computer Exchange.....431-8664, b
Computer UFO Network.....722-5738, a
Cosmos ..... 878-8610, a, 9pm-6am
Crab Nebula.....789-3769, a
Dial Your Match: Purple Rain Dating Svc I..... .....432-1499, a, 9pm-6am; 24wknds
Dial Your Match: Purple Rain Dating Svc. II... .....839-3415, a
Diamond Jims .....244-4410, a
Downspout .....325-1325, c
Dungeon Quest ..... 789-4794, a
Dwarf's Realm .....255-1067, a, 9pm-10am
Eagle's Nest.....735-0259, a, 8pm-7am
Echo II.....622-8633, b, 5:30pm-8am
Elite Circle..... 522-8867, b, 4pm-2am
Elm Street..... 347-2774, b, 7pm-7am
Emerald City Trading Company....524-7438, b
End of the Line ..... 759-5421, b
Entertainer .....328-8665, b
Eskimo North/Polynet port 1 .... 367-3837, b
Eskimo North/Polynet port 2 .... 365-2133, b
Eskimo North/Polynet port 3.....365-0641, b
Eskimo North/Polynet port 4.....365-1724, b
ESP .....885-1722, b, 10pm-6:30am
Eugene's House.....523-2530, a
Event Horizon.. 392-5829, a, 9:30pm-5:30am
Everette Software Trading System355-4340, b
Extensive Entertainment ..... 939-2164, b
Fido: Articnet ..... 565-9740 c
Fido: BECS MS-DOS.....235-9497, c
Fido: Dalmation ..... 753-1021, c
Fido: Data Jockey.....643-0909, b, 7pm-6am
Fido: Educators Net.....438-4495, c
Fido: Glacier Peak Rainbow .....644-8431, b
Fido: Heath/Zenith..... 941-6943, b
Fido: Mac's Revenge ..... 752-8481, b
Fido: Microrim Tech Support..... 881-8119, b
Fido: Probus International..... 848-9232, b
Fido: PTC-Net 757-5233, c, 5pm-7am; 24wknds
Fido: Region X.....442-8127, c
Fido: Renton Vo. Tech.Insti.235-2300, c, 5pm-7am
Fido: Trouble Shooter ..... 922-0106, c
Fido: Unknown.....838-6860, b
FoReM ST: Asylum..... 347-1008, c
FoReM ST: Automan's Garage ...228-0147, b
FoReM ST: Baker Street.....854-0193, a
FoReM ST: Bogus Zone .....631-1159, a
FoReM ST: B.R.A.C.E. .....883-7529, b
FoReM ST: DOSFile .....367-3453, c
FoReM ST: Foundation And Empire323-1330, c
FoReM ST: Gas XE .....745-4077, b
FoReM ST: Knotthead's Nook ...631-8056, b
FoReM ST: S*P*A*C*E / Butler's BBS941-2824, b
FoReM ST: Xanth II-ST ..... 682-8039, c
FPS Techboard .....565-9465, b
Free City of Greyhawk.....698-2194, b
Future World.....546-4972, a
Gateway ..... 698-1388, b
Golf Distraction Dimension..... 839-8670, b
Grandmaster Enterprises742-8423, a, 10pm-6pm



Guardians of the Night/Warezhouse 363-8830, b
Harry's Hideaway ..... 226-7506, a, 8pm-7am
High Tech.....783-4818, a
I.B.S. Systems: Tech Syst. 451-1068, a, 10pm-7am
IdeaTree: Fin d'siecle..(Century) ...525-5150, a
IdeaTree: Invisible Seattle..... 784-7685, b
IdeaTree: ProtoSoft ..... 932-7125, b
IdeaTree: Wrong Number.....584-7673, b
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Mushroom Shop][..... 641-3705, a
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Northwest Micronet .....535-2837, b
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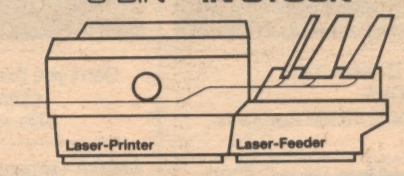

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Manufactured in the USA, the PowerPak 286 is now only $2995. The PowerPak 286™ is a complete AT compatible, optimized for compute intensive software like CAD, desktop publishing and spreadsheet programs. In fact, the PowerPak 286 **runs two times faster than the IBM AT** and is about one-half the cost of a comparably equipped IBM AT.

How Can the PowerPak 286 Execute Programs in Half the Time?

The PowerPak 286 incorporates the latest technology from leading manufacturers. High-grade chips and components are selected at every critical signal path so instead of you waiting for the computer, it waits for you.

Leading Manufacturers

1. INTEL—10 megahertz 80286 16-bit microprocessor
2. SEAGATE—38 millisecond hard disk
3. TEAC—1.2 MB and 360K floppy drives
4. WESTERN DIGITAL—Chip set for hard and floppy disk

Recently a potential customer tested the PowerPak 286 using the Norton utilities. We rated 10.3 on the Norton index which means over 10 times faster than an IBM PC.

Crystal Clear Color

The PowerPak 286 comes complete with a Everex EGA card and 14" Tatung color monitor with 640×350 resolution. Choose 16 colors from a palette of 64 or switch to text mode. Conveniently located on the monitor's front panel are the power switch, brightness and contrast controls. The Everex high-speed graphics display card is 100% compatible with the IBM EGA standard. Also, emulates monochrome and CGA.

The Triple $99 Special Offer...

Now for a limited time, if you purchase any one of the PowerPak ATs, you can bundle any combination of the following for only $99 each.

- ☑ 1-Year On-Site Service $99
- ☑ PC Mouse/Driver Software $99
- ☑ Delivery, Set-Up, Installation $99

Fast Memory to Spare...

The PowerPak 286 comes **complete** with an abundance of high-speed memory including two TEAC floppy disk drives, SEAGATE 40 megabyte hard disk and 1 MB of memory on the mother board. See chart and footnotes below.

Memory	Size	Access Times
RAM	1 MB	150 nanoseconds
*Hard disk drive	40 MB	38 milliseconds
**Floppy Drive A	1.2 MB	
**Floppy Drive B	360 KB	

*Hard disk longevity and protection is provided by special shock absorbing mounts.
**Two floppy disk drives are included so you can run all of your existing software as well as creating new disks for 360K-based machines.

1 Year Warranty Plus On-Site Service Available...

All of the computers listed below include a one-year warranty covering all parts and labor. In addition, on-site service is available for only $99 for the first year. The on-site service is for 8-hour response time and is available to new customers of Evergreen Systems within an 80-mile radius of Bellevue, Washington.

*Price List

PowerPak 286 $2995 + tax

PowerPak 286 $3195 + tax
w/ NEC MultiSync

CAD Master $3495 + tax
includes 80287 math coprocessor and NEC MultiSync monitor

CAD Master Plus $3995 + tax
includes 72 MB hard disk w/ 23 MS access time

NEW! CAD Master Workstation $5995 + tax
The CAD Master Workstation includes the CAD Master computer described above, Auto CAD 2.6 and Summa-Sketch digitizer with 4 button curser and stylis.

NEW! The Publisher $5995 + tax
The Publisher is a desktop publishing system which includes the PowerPak 286 computer, HP Laserjet Series II and the Ventura Publisher.

Desktop Publishing and CAD Training Included

Free initial training is included with the Publisher and the CAD Master workstation. Also, our trained personnel are available for more extensive training on an hourly basis.

PowerPak 286 Workstation Specifications

Memory

- Floppy A 1.2 MB
- Floppy B 360 KB
- Hard Disk Drive C 40 MB
- RAM 1MB

14" Color Monitor

- (640×350) resolution
- Front panel mounted: power switch, brightness and contrast controls
- Choose 16 colors from a palette of 64 colors

Input/Output

- 2 serial ports
- 1 parallel port
- Clock calendar
- Color graphics display card –100% EGA compatible also emulates CGA and monochrome 'Hercules' graphics adapter
- Floppy and hard disk controller card

Software Included

- PC-DOS ver. 3.1
- I/O utilities (1 disk)
- EGA utilities (1 disk)
- Hard disk utilities (1 disk)

Features

- Enhanced keyboard with 12 function keys
- Eight AT style expansion slots
- Mother board socket for 80287 math coprocessor
- 192-watt power supply w/surge prot.
- 110- or 220-volt input switch
- Ultra quiet high volume cooling fan

*NOTE: This special offer effective after May 1, 1987.

Evergreen Systems, Inc.

P.O. Box 6804
Bellevue, Washington 98008

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To Order Call

(206) 455-0825 in Washington

(503) 242-2905 in Oregon